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A further new species of *Leiurus* Ehrenberg, 1828 (Scorpiones: Buthidae) from the South of Niger and confirmation of the extension of the distribution range of the genus to the Southern zones of the Sahara Desert

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Abstract

One more African new species belonging to the genus *Leiurus* Ehrenberg, 1828 is described. The description is based on six adult males and one adult female collected in the region of Mir, South of Niger. The new species shows affinities with other *Leiurus* species distributed in the Western portion of Africa; however, several characteristics attest that, once again, this population is certainly distinct. The ecological features of the type locality are particular since the area is characterised by savannah-like vegetation, instead of arid-desert formations; formation previously defined exclusively for *Leiurus savanicola* Lourenço, Qi & Cloudsley-Thompson, 2006 described from Cameroon and *Leiurus nigerianus* Lourenço, 2021 described from Nigeria. This new scorpion taxon represents the 28th known species of the genus *Leiurus*. Comments are equally proposed on the recent synonymy of *Leiurus aegyptiacus* Lourenço & El-Hennawy, 2021 with *Leiurus libycus* (Birula, 1908), and this species is revalidated. A geographical distribution map of the distribution of the African species of the genus *Leiurus* is presented.

Keywords: Scorpion, systematics, *Leiurus*, savannah-like vegetation, Sahel, Niger, Africa.

Introduction

Already in previous publications dating of almost a quarter of century ago (Lourenço *et al*., 2002, 2006) it was outlined that the genus *Leiurus* Ehrenberg, 1828 has been represented during quite many decades by a single species, *Leiurus quinquestriatus*, containing two subspecies, *L. quinquestriatus quinquestriatus* (Ehrenberg, 1828) and *L. quinquestriatus hebraeus* (Birula, 1908). In some major publications such as Vachon (1952) it was suggested that *Leiurus quinquestriatus* appeared to be a common species in the desert faunas of several regions of Egypt, Sinai and Sudan, although the precise identity of some regional populations from these areas probably required more detailed investigations (*e.g.* Lowe *et al*., 2014). Subsequently, *L. hebraeus* (Birula, 1908) was recognized as a valid species with a large distribution in Palestine/Israel and nearby countries (Levy *et al*., 1970; Lowe *et al*., 2014). *Leiurus* species are globally infamous since they secrete one of the most noxious venoms among buthid scorpions in general, and are responsible for very serious human incidents (for details refer to Lourenço & Rossi, 2016). Because of this infamous reputation as a very dangerous scorpion, the toxins of both *L. quinquestriatus* and *L. hebraeus* have been the subject of numerous biochemical studies (for references see Simard & Watt, 1990; Loret & Hammock, 2001). Nevertheless, many aspects of the taxonomy of the genus *Leiurus* remained confused for many decades (Lourenço *et al*., 2006; Lourenço & Rossi, 2016; Lowe *et al*., 2014).

In more recent years, a noticeable number of new species were finally described in the genus *Leiurus*. The description which really changed most conservative views about this group of scorpions was that of *Leiurus jordanensis* Lourenço, Modry & Amr, 2002 described from Jordan (Lourenço *et al*., 2002). Just a few years later, *Leiurus savanicola* Lourenço, Qi & Cloudsley-Thompson, 2006 was described from Cameroon, representing the second confirmed species from Africa (Lourenço *et al*., 2006).

In a parallel contribution, Lowe *et al*. (2014) proposed a very extensive revision of the genus *Leiurus*, but dealing mainly with the populations from the Arabian Peninsula. The status of some old species was revalidated, one recently described species was placed in synonymy, one subspecies was raised to species and four new species were described. We agree with these authors in some points, in particular with their opinion about the African species: *'Our findings show that, like many other scorpion genera, Leiurus is comprised of an assemblage of allopatric or parapatric species spread across different regions separated by physiographic barriers, each adapted to local environments and substrates. Additional species diversity may emerge when other local populations are analysed in more detail, for example those in southern Sinai and in more central parts of North Africa'.*

Shortly after, it clearly appeared that the African populations of *Leiurus* have been largely neglected and should require more intensive studies. These led to the descriptions of several new species (Badry *et al*., 2023; Kovařík & Lowe, 2020; Lourenço & Rossi, 2016; Lourenço *et al.*, 2018; Lourenço, 2019, 2020a,b, 2021; Lourenço & El-Hennawy, 2021; Lourenço & Ythier, 2024; Yağmur *et al*., 2025a).

The descriptions of these many new species were possible partially due to new collecting (Kovařík & Lowe, 2020; Lourenço *et al*., 2018; Lourenço & El-Hennawy, 2021) but in almost the majority of the cases. these were based on the existence of more or less 'old' specimens available in collections such as that of the Muséum national d'Histoire naturelle in Paris, but not previously studied. In many, if not most cases these 'old' specimens were collected in regions which are now more difficult to survey in present days, mainly due to security reasons (Lourenço, 2020a,b, 2021; Lourenço &

Ythier, 2024). Most historical aspects concerning the genus *Leiurus* were largely treated in an important number of recent publications and consequently will not be further discussed here (Lourenço, 2019, 2020a,b; Lourenço & El-Hennawy, 2021). In this contribution, attention is given to several specimens collected more than a half century ago in the South of Niger. Until that date it was assumed that only the classical species *Leiurus quinquestriatus* (Ehrenberg, 1828) was present in Africa, including some desert zones of Niger, which are rather far from the site where the new species was collected. The present location represents a totally new record for a *Leiurus* in this part of the country. Since the specimens present some morphological differences in relation to other recently described species and in account of the markedly distinct habitat in which they were collected, a new species is presently described.

Comments are also proposed about the recent decision of placing *Leiurus aegyptiacus* Lourenço & El-Hennawy, 2021 in the synonymy of *Leiurus libycus* (Birula, 1908) (Yağmur *et al*., 2025b).

Methods

Illustrations and measurements were obtained using a Wild M5 stereo-microscope with a drawing tube and ocular micrometre. Habitus photographs were made with a Canon EOS RP and Adobe Photoshop software. Measurements follow Stahnke (1970) and are given in mm. Trichobothrial notations follow Vachon (1974) and morphological terminology mostly follows Vachon (1952) and Hjelle (1990). Material studied herein is deposited in the collections of the MNHN (Muséum national d'Histoire naturelle), Paris, France.

Taxonomic treatment

Family **Buthidae** C.L. Koch, 1837
Genus ***Leiurus*** Ehrenberg, 1828
Leiurus sahelicus sp. n. (Figs. 1-14)

Type material. Niger, Region of Mir, 310 m, X/1959 (J. Vedy leg.), in savannah-Sahel-like formation. 1 male holotype and 5 males and 1 female paratypes. Type material deposited in the Muséum national d'Histoire naturelle, Paris.

Etymology. The specific name refers to the Sahelian zone, where the new species was found.

Diagnosis. Total lengths for the male holotype and female paratype are respectively 72.1 and 83.8 mm. Ground colour yellowish to pale reddish for the body; yellow to pale yellow for the appendages; ventral carinae of metasomal segments not spotted; segment V slightly spotted with blackish pigmentation. Carapace not spotted. Prosoma with anterior margin of carapace almost straight; ocular tubercle moderately prominent. Pectines with 33-35 teeth for male holotype; paratypes with 31 to 33 teeth in males and 25-27 teeth in female. Median carinae moderate on sternite III, weakly marked on sternite IV; sternite VII with intercarinal surface almost without granulations. Pedipalp fixed and movable fingers with 12-12 rows of granules in all males and female. Telson with a long aculeus, with a similar length to that of vesicle; moderately curved. Dorsal trichobothrium of femur $\mathbf{d_4}$ in the same position of external trichobothrium $\mathbf{e_1}$; fixed finger trichobothrium **db** in only a slightly distal position in relation to **est**. The global

trichobothrial pattern of the new species is quite similar to that of other *Leiurus* species from Occidental Africa.

Figs. 1-4. *Leiurus sahelicus* sp. n., habitus. 1-2. Male holotype. 3-4. Female paratype. 1, 3. dorsal aspect. 2, 4. ventral aspect. (Scale bar: 2 cm).

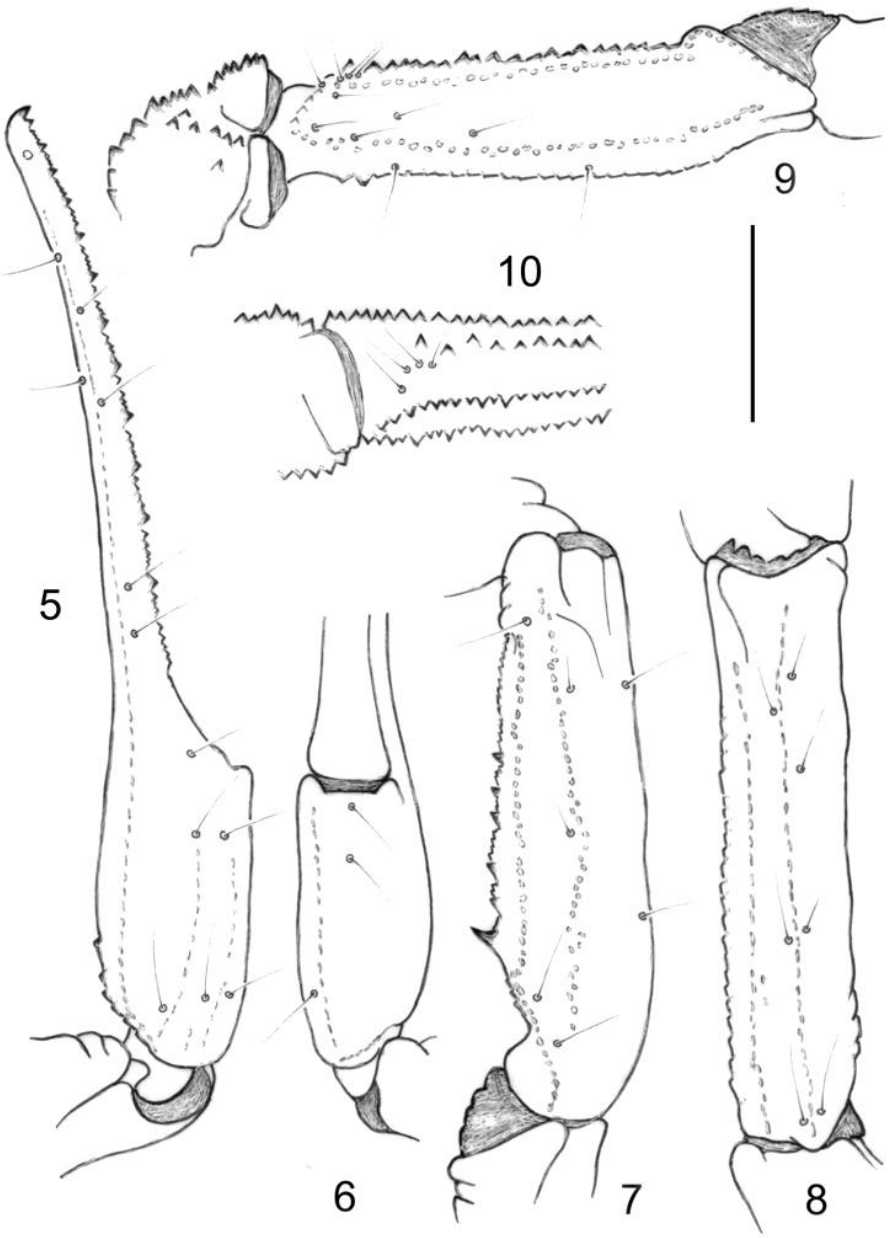
Description based on holotype and paratypes (morphometric values after the description):

Colouration (in alcohol). Ground colour yellowish to pale reddish; pedipalps and legs yellow to pale yellow. Carapace pale yellow without spots; eyes slightly blackish. Mesosoma yellow to reddish-yellow without any infuscations on tergites I to VI. Metasomal segments I and II reddish-yellow; III and IV yellow, without spots over ventral carinae; segment V yellow slightly spotted with blackish pigmentation. Vesicle pale yellow slightly reddish laterally; aculeus yellow at the base and reddish at its extremity. Venter globally yellow to reddish-yellow. Chelicerae yellow without any reticulated spots; teeth reddish. Pedipalps pale yellow overall except for the rows of granules on chela fingers which are slightly reddish. Legs pale yellow.

Morphology. Prosoma: anterior margin of carapace almost straight. Carapace carinae moderately to strongly developed; central median carinae moderate; anterior median carinae moderate to strong; central lateral weak; posterior median and posterior lateral carinae moderate to strong terminating distally in a weak spinoid process that extends slightly beyond the posterior margin of the carapace. Intercarinal spaces with very few irregular granules, and most of the surface almost smooth, in particular laterally and posteriorly. Median ocular tubercle slightly anterior to the centre of the carapace and moderately prominent; median eyes large in size and separated by about two ocular diameters; five pairs of lateral eyes, the fourth and fifth pairs reduced to vestigial. Mesosomal tergites I and II pentacarinate, III and VI tricarinate. All carinae moderate to strong, terminating distally in a spinoid process that extends slightly beyond the posterior margin of the tergite. Median carinae on I moderate, on II-VI moderate to strong. Tergite VII pentacarinate, with lateral pairs of carinae strong and fused; median carinae present on the proximal half, strong. Intercarinal spaces weakly granular. Lateral carinae moderate to weak on sternite III, moderate on sternite IV and strong on V; median carinae moderate on sternite III, weakly marked on sternite IV. Pectines moderately long; pectinal tooth count 31 to 33 in males and 25-27 in female. Metasomal segments I and II with ten carinae, moderately crenulate; lateral inframedian carinae complete on I, represented in its posterior one third zone by several granules on II, III and IV with eight carinae. Dorsal and dorsolateral carinae moderate, without any enlarged denticles distally. All other carinae moderate to weak on segments I to IV. Segment V with five carinae; ventromedian carinae with several spinoid granules distally; anal arch with three slightly spinoid lobes. Dorsal furrows of all segments weakly developed and smooth; intercarinal spaces almost smooth, with only a few granules on the ventral surface of segment V. Telson smooth; subaculear tubercle absent; aculeus with a similar length to that of vesicle; moderately curved. Chelicerae with two denticles at the base of the movable finger (Vachon, 1963). Pedipalps: trichobothrial pattern orthobothriotaxic, type A (Vachon, 1974); dorsal trichobothria of femur in β (beta) configuration (Vachon, 1975). Dorsal trichobothrium of femur $\mathbf{d_4}$ in the same position of external trichobothrium $\mathbf{e_1}$, fixed finger trichobothrium **db** in only a slightly distal position in relation to **est**. Femur pentacarinate; all carinae moderately crenulate. Patella with seven carinae; all carinae moderately crenulate; dorsointernal carinae with a few small spinoid granules. Chelae slender, with elongated fingers, smooth and without carinae. Dentate margins of fixed and movable fingers composed of 12-12 almost linear rows of granules in all examined specimens. Legs: ventral aspect of tarsi with short spiniform setae more or less arranged in two rows; tibial spurs present on legs III and IV, moderately marked; pedal spurs present on all legs, moderately marked.

Morphometric values of the male holotype/female paratype of *Leiurus sahelicus* sp. n.
Total length including the telson, 72.1/83.8. Carapace: length 7.9/9.6; anterior width 5.4/6.6; posterior width 8.8/10.6. Mesosoma length: 19.4/20.8. Metasomal segments. I:

length 5.8/7.0, width 4.8/5.7; II: length 6.8/8.1, width 4.0/4.8; III: length 7.2/8.4, width 3.9/4.3; IV: length 7.7/9.2, width 3.4/4.0; V: length, 9.2/11.1, width 3.2/3.8, depth 3.1/3.7. Telson length 8.1/9.6; vesicle: width 3.0/3.7, depth 2.8/3.4. Pedipalp: femur length 8.2/9.9, width 2.0/2.5; patella length 8.9/10.7, width 2.5/3.1; chela length 14.7/17.8, width 2.1/2.7, depth 2.2/2.8. Movable finger length 10.3/13.0.

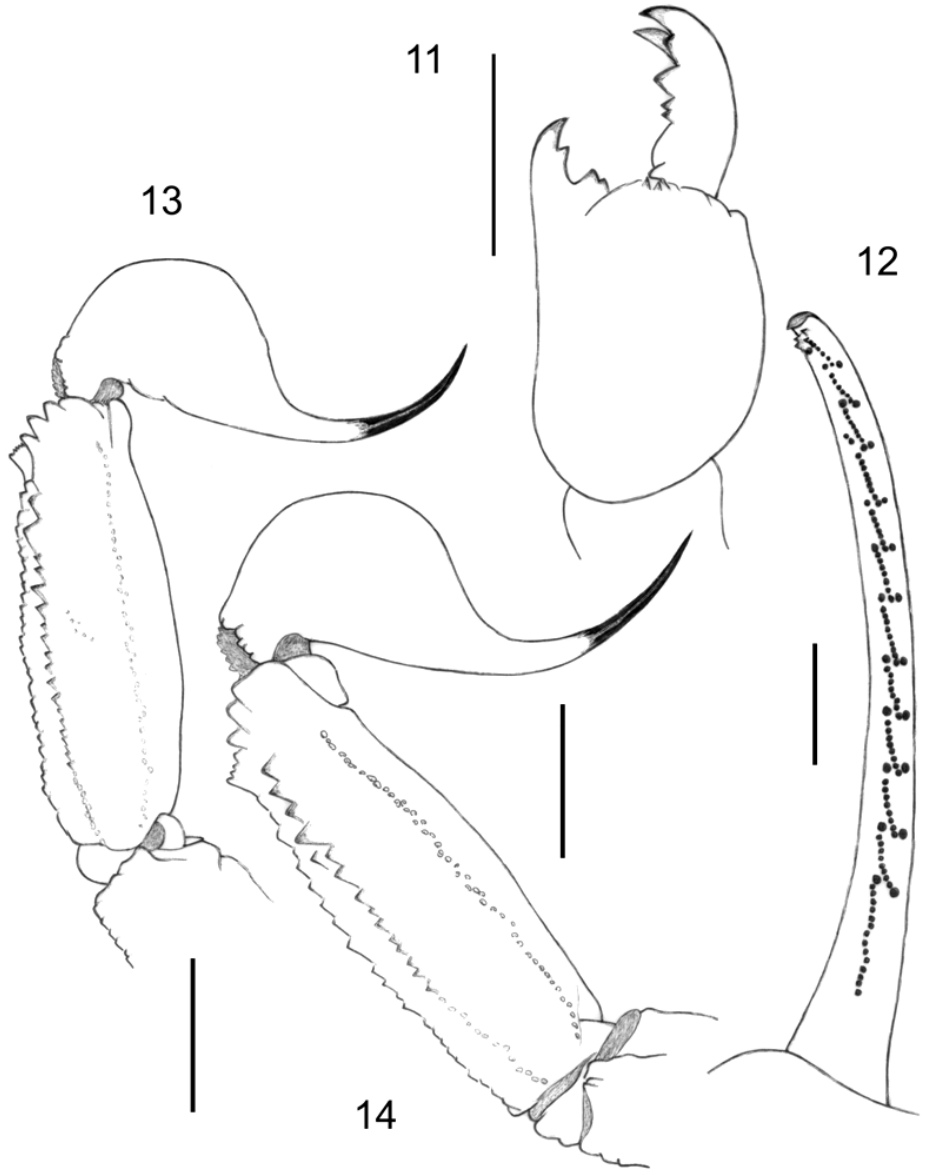


Figs. 5-10. *Leiurus sahelicus* sp. n., male holotype, trichobothrial pattern. 5-6. Chela, dorso-external (5) and ventral (6) aspects. 7-8. Patella, dorsal (7) and external (8) aspects. 9-10. Femur, dorsal (9) and internal (10) aspect. (Scale bar: 3 mm).

Relationships

The new species shows clear affinities with *Leiurus nigerianus* Lourenço, 2021 and to a less extent with *Leiurus savanicola*, both species described from zones of Sahel/Savannah transition areas respectively in the North of Cameroon and South of

Nigeria. Nevertheless, the new species can be distinguished by a number of characters, notably: (i) a more yellowish to reddish global colouration, paler however than that of *L. savanivola*, (ii) median carinae on sternite III moderate (weak to absent in *L. nigerianus*), (iii) 12-12 rows of granules on pedipalps fixed and movable fingers of all examined specimens (11-12 in *L. nigerianus*, 13-13 in *L. savanicola*), (iv) anterior margin of carapace almost straight (weak concavity in *L. nigerianus*), (v) five pairs of lateral eyes with the fourth and fifth pairs reduced to vestigial (four pairs of lateral eyes with the fourth pair reduced to vestigial in *L. nigerianus* and *L. savanicola*), (vi) aculeus moderately curved (weakly curved in *L. nigerianus*), (vii) pedipalps particularly slender, especially the chela manus with length/width ratio 2.09 in male (1.77 in male *L. savanicola*), (viii) trichobothria $\mathbf{d_3}$ to $\mathbf{d_5}$ of patella in a more distal position.



Figs. 11-14. *Leiurus sahelicus* sp. n. 11. Male holotype, chelicera, dorsal aspect. 12. Female paratype, movable finger showing the rows of granules. 13-14. Metasomal segment V and telson, lateral aspect. 13. Male holotype. 14. Female paratype. (Scale bars: Figs. 11-12: 2 mm, Figs. 13-14: 3 mm).

Biogeographical and ecological considerations

The typical vegetation formation in which the new scorpion was found is the West Sudanian savannah, which corresponds to a tropical savannah ecoregion that extends across West Africa as a belt between humid forests in the South and arid zones and deserts in the North (see Fig. 1 in Dalibard *et al.*, 2014). The ecoregion stretches east and west across West Africa from the Atlantic coast of Senegal to the Mandara Mountains on Nigeria's eastern border. The much drier Sahelian Acacia savannah is located to the North while the humid Guinean forest-savannah mosaic extends in the South.

The weather conditions are dominated by a typical tropical climate. Annual rainfall ranges from 1000 mm in the South to 600 mm in the North on the edge of the Sahel. Rainfall and temperature vary seasonally, with a hot rainy season from May to September, and a cooler dry season from October to April. Temperatures range from 30 to 33°C during the hottest month and from 18 to 21°C during the coldest month.

The characteristic vegetation formations are Savannah and open woodland. Common savannah tree species belong to genera *Combretum* and *Terminalia* while the soil is covered with long grasses, herbs, and shrubs. Species of *Hyparrhenia*, or elephant grass, is the predominant grass, and often grows up to one metre or more in height. Trees in the drier woodlands are generally not high and never reach up to 10 metres. These include in particular species of *Anogeissus*, but equally of *Acacia*, *Combretum*, *Commiphora*, *Prosopis*, *Tamarindus*, and *Ziziphus*.

The diversity is much less important than that observed in the neighbouring forest (Muoghalu & Isichei, 1991; Ekwealor *et al.*, 2020). Since 2017, approximately 14% of this ecoregion was assessed as a protected area.

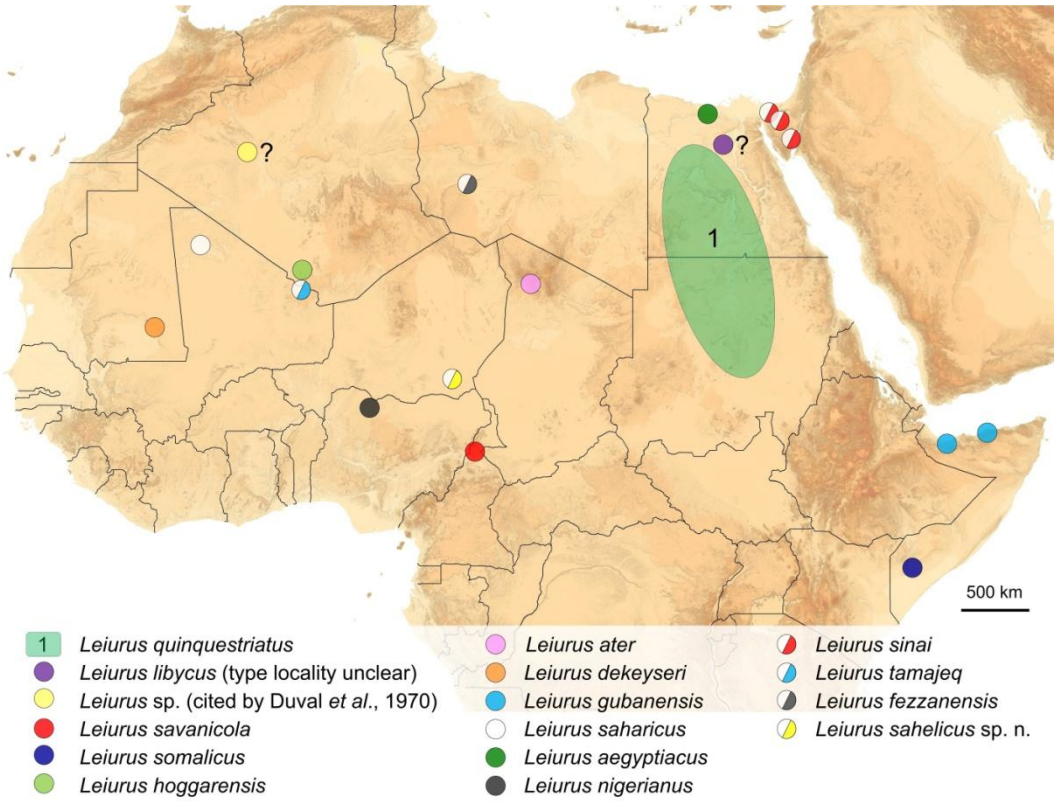


Fig. 15. Map of Northern Africa showing the approximate distribution of the known *Leiurus* species (modified from Lourenço & Ythier, 2024).

Further comments on the distribution of the genus *Leiurus* in Africa

In several previous publications (Lourenço, 2020b; Lourenço & El-Hennawy, 2021; Lourenço & Ythier, 2024) and following the discoveries and descriptions of new *Leiurus* species in Africa, the presence of the genus was confirmed for a number of countries: Algeria, Cameroon, Chad, Egypt, Libya, Mali, Mauritania, Niger, Somalia, Somaliland, Sudan, and Nigeria. Occurrences for some other countries require yet a precise confirmation as for Ethiopia and Tunisia. The major population in Africa clearly corresponds to *Leiurus quinquestriatus* in Egypt and Sudan while the other species most certainly show patchy distributions (Fig. 15). The description of one more new species from the South of Niger, collected in Sahel/Savannah transition areas, brings further confirmation to this patchy model of distribution. The population of the new species most certainly represents one more case of endemism located in a very particular ecological habitat, out of the arid and desert zones where most species are present.

Comments on the decision of Yağmur *et al*. (2025b) about placing *Leiurus aegyptiacus* Lourenço & El-Hennawy, 2021 in the synonymy of *Leiurus libycus* (Birula, 1908)

Leiurus libycus was originally described by Birula (1908) as *Buthus quinquestriatus libycus*, based on a male juvenile specimen collected in 'Desert Libycum'. Locality also confirmed by Fet & Lowe (2000) in the Catalog of the scorpions of the World as Libyan Desert, Libya. This species (or subspecies) was subsequently neglected and finally placed in the synonymy of *Leiurus quinquestriatus* by Vachon (1949). Nevertheless, in more recent publications (*e.g.* Lourenço *et al*., 2018) it was stated that the true identity of this population would require yet further studies, based on the collection of new material from the supposed original zone of distribution.

In a recent publication, Yağmur *et al*. (2025b) reconsidered *Leiurus libycus* as a valid species, based however on the single reanalysis of the juvenile holotype which was redescribed; decision which *a priori* can be accepted. A second decision of these authors, of placing *Leiurus aegyptiacus* Lourenço & El-Hennawy, 2021 in the synonymy of *L. libycus*, appears however as extremely light based on possible speculative arguments. The reanalysis of a number of their arguments leads to the following conclusions:

- The original type locality, Libyan Desert, formally supposed to be located in Libya (Fet & Lowe, 2000) is relocated by these authors within the borders of Egypt and precisely between Alexandria and Fayum. In the illustrated page of the personal catalog of Birula, the indication is 'Desert Libycum', without further precision. However, the holotype of *L. lybicus* was collected by Wilhelm Junker during his travels between northern Egypt and northern Sudan (Junker, 1890, 1891). In his travel writings, Junker (1890) illustrates his journey with a map of north eastern Africa where "Libyan Desert" is indicated for the Western Desert of Egypt, extending up to northern Sudan. We can then consider that the holotype of *L. libycus* was indeed collected in this broad area. No mention about a more precise location like "between Alexandria and Fayum" as stated in Yağmur *et al*. (2025b) is indicated however. Since the type locality of *L. aegyptiacus* is also located in the same broad area, these authors extrapolate this point as a solid argument to place the two species in synonymy (Fig. 15).

- Yağmur *et al*. (2025b) have not examined the holotype of *L. aegyptiacus* which, by the way, is also a juvenile but a female. The only morphological argument used by these authors is a convergent trichobothrial pattern of the fixed finger of the pedipalp which according to them is 'nearly identical'. It happens however that quite many other

Leiurus species described from Africa have quite similar trichobothrial patterns. Consequently, we do consider the single morphological argument as irrelevant.

In face of these new arguments, *Leiurus aegyptiacus* is reestablished at present as a valid species.

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A new *Androctonus* Ehrenberg, 1828 species from southern Jordan with implications for regional taxonomy and distribution (Scorpiones: Buthidae)

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Abstract

A new buthid scorpion species, *Androctonus minaeus* sp. n., is described from the Ma'an governorate in southern Jordan. This study provides a detailed morphological description, morphometric analysis, and diagnostic comparison with closely related species, particularly *Androctonus bicolor* and *A. tenuissimus*, using comparative material of these species from Egypt, along with ecological and distributional notes for each. Historical records of *A. bicolor*, *A. amoreuxi*, and *A. australis* from Jordan are reviewed and considered unverified due to the absence of supporting morphological data, and are therefore excluded from the confirmed scorpion fauna of Jordan pending further evidence. A distribution map of all examined specimens, along with previous records of related species from Egypt, is also provided to enhance our understanding of the geographic range and biogeography of this genus. The new species is distinguished by a unique combination of characters, including colouration, carinal development, and pedipalp proportions. The results contribute to a refined understanding of *Androctonus* diversity in the Levant and underscore the importance of critical reevaluation of regional scorpion records.

Keywords: Scorpions, *Androctonus minaeus*, Buthidae, Ma'an governorate, Jordan.

Introduction

The genus *Androctonus* Ehrenberg, 1828, among the most medically significant scorpion genera globally, was first described in the monumental zoological contributions by Hemprich & Ehrenberg (1828, 1829) during their exploration of northern Africa and western Asia. Characterized by robust morphology, potent venom, and a wide distribution across arid and semi-arid regions of North Africa and the Middle East, the genus has undergone several taxonomic revisions and remains the subject of continuous faunistic and phylogenetic studies, especially in biogeographically complex areas like the Levant, Currently, 53 valid species and 4 subspecies are recognized within *Androctonus* (Rein, 2025).

Androctonus bicolor Ehrenberg, 1828 has long been a source of taxonomic confusion, largely due to the limited diagnostic detail provided in its original description and the subsequent proliferation and synonymization of multiple subspecies (C.L. Koch, 1839; Caporiacco, 1932; Vachon, 1952; Levy & Amitai, 1980; Fet & Lowe, 2000; Kovařík & Whitman, 2005; Lourenço, 2005). Many of these subspecies share a pronounced morphological trait—slender pedipalps—which has contributed to their misidentification and taxonomic overlap. Teruel *et al.* (2013) re-evaluated the status of *A. bicolor* and its subspecies, and in doing so, described *Androctonus tenuissimus* Teruel, Kovařík & Turiel, 2013 as a closely related species from northwestern Egypt. Later, Teruel & Kovařík (2014) revisited the taxonomy of *A. bicolor* by examining the original types housed at the Zoology Museum of the Humboldt University in Berlin (ZMB), they also designated a new lectotype offering critical morphological clarification and enhancing the resolution of its taxonomic identity.

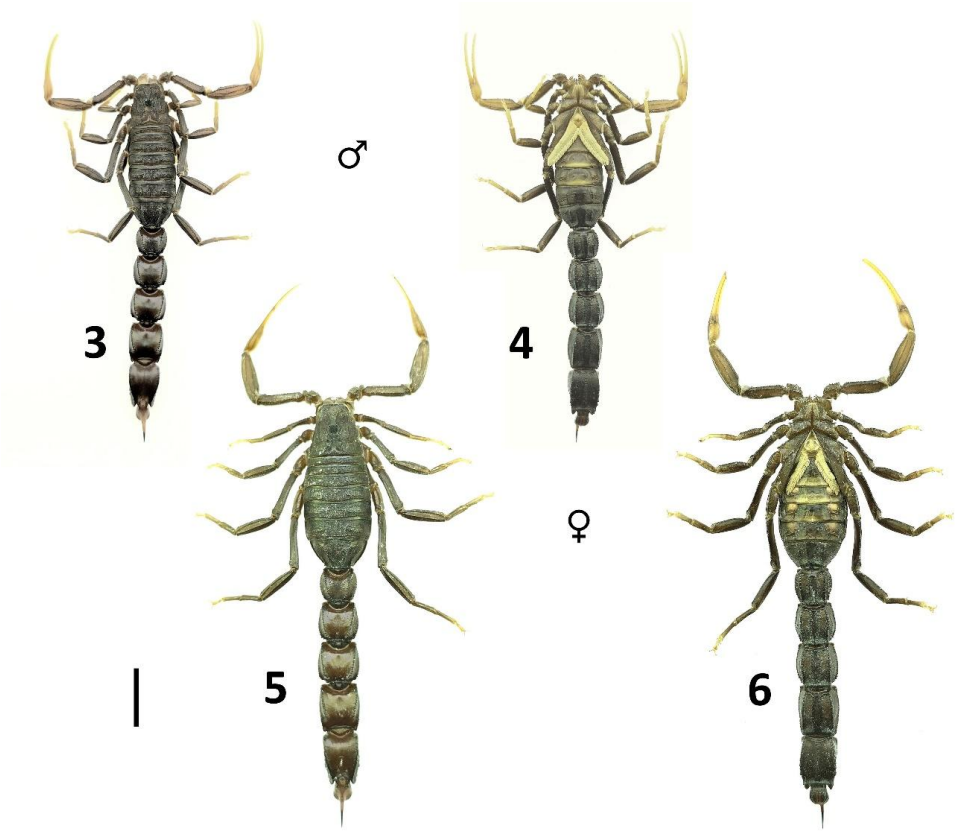
The aim of the present study is to conduct a thorough taxonomic reassessment of the *Androctonus* populations from southern Jordan that have historically been identified as *A. bicolor* (Kinzelbach, 1984, 1985; El-Hennawy, 1988; Amr *et al.*, 1988; Amr & Al-Oran, 1994) by employing detailed morphological analyses and comparative morphometric evaluations. This research seeks to determine whether these populations represent true *A. bicolor* or constitute a distinct, previously unrecognized taxon. Special emphasis is placed on comparing the Jordanian specimens with closely related species such as *A. bicolor* and *A. tenuissimus* from Egypt, in order to assess the validity of previous records. The results are intended to expand our understanding of *Androctonus* diversity in Jordan and contribute to broader efforts in scorpion systematics and biogeography across the Middle East.

Material and Methods

The specimens were collected by ultraviolet (UV) detection, photographed and preserved in 80% alcohol. Holotype male and other paratypes are deposited in Bassam Abu Afifeh private collection (BAPC).

Illustrations and measurements were made with the aid of stereoscopic microscope with a camera and an ocular micrometer (efix). Measurements follow Stahnke (1970) and are given in mm. Illustration under UV illumination was after Volschenk (2005). Trichobothrial notations follow Vachon (1974, 1975) and morphological terminology mostly follows Vachon (1952) and Hjelle (1990).

Figs. 1-2. *Androctonus minaeus* sp. n. in vivo habitus. 1. Male holotype. 2. Female paratype.



Figs. 3-6. *Androctonus minaeus* sp. n., habitus under white light. 3-4. Male holotype. 5-6. Female paratype. 3, 5. dorsal view. 4, 6. ventral view. (Scale bar: 10 mm).

Systematics

Family **Buthidae** C.L. Koch, 1837
Genus ***Androctonus*** Ehrenberg, 1828
Androctonus minaeus sp. n.
(Figs. 1-20, 31, 34, 37-42, 47, 50; tables 1-3)

Type locality and type depository: Jordan, Ma'an governorate, Basta, 30°13'30.3"N, 35°30'19.8"E, 1538 m a.s.l., BAPC.

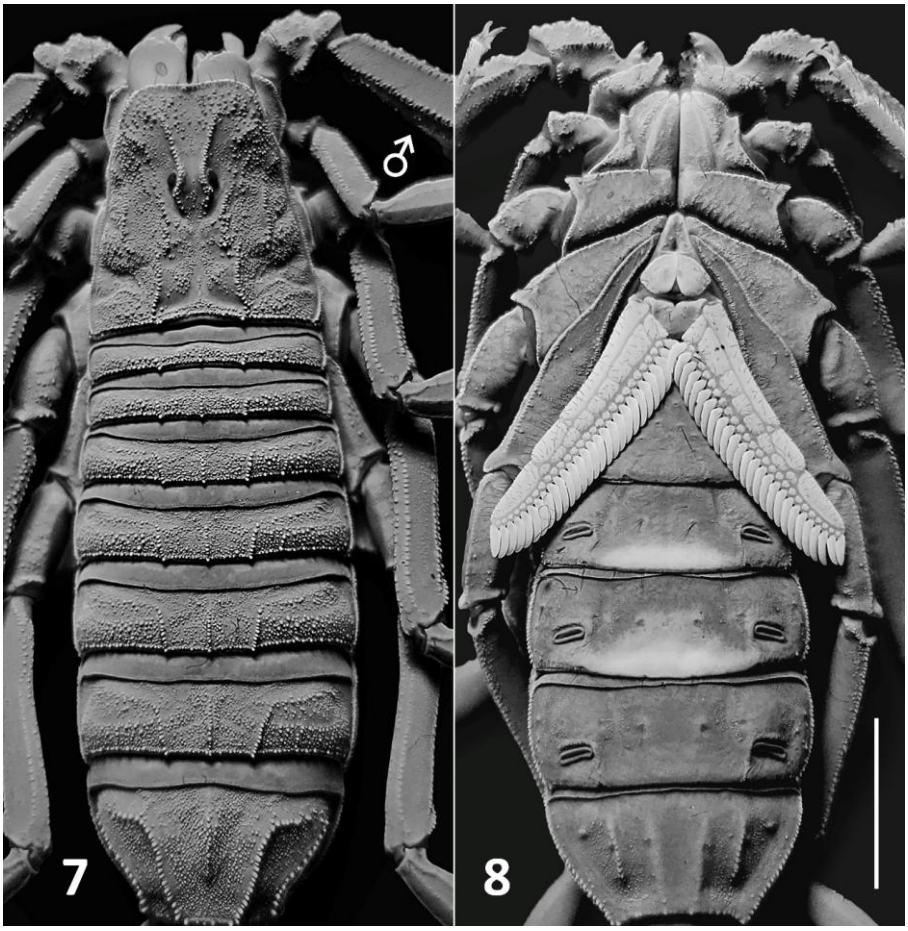
Type material examined: **Jordan**: 1♂ (holotype), 1♂ (paratype), BAPC 0600-0601, 2.5 km W of Basta, Ma'an governorate, 30°13'30.3"N, 35°30'19.8"E, 1538 m a.s.l., 7 September 2023, *leg*. M. Al-Saraireh & B. Abu Afifeh; 2♂♂ (paratypes), BAPC 0602-0603, Basta, Ma'an governorate, 30°13'46.8"N, 35°31'33.7"E, 1491 m a.s.l., 8 August 2023, *leg*. M. Al-Nuaimat; 1♀ (paratype), BAPC 0604, Rawdat Al Ameer Rashid, Ma'an governorate, 30°17'01.4"N, 35°33'05.3"E, 1461 m a.s.l., 7 August 2024, *leg*. M. Al-Nuaimat.

Comparative material examined:
Egypt: ***Androctonus bicolor*** (Figs. 21-24, 30, 33, 36, 43, 44, 48, 51; tables 1-3): 1♂, BAPC 0605, Marsa Matrouh, Marsa Matrouh governorate, 31º20'23.46"N, 27º14'10.97"E, 24 m a.s.l., 9 October 2023, *leg*. Islam Omar. ***Androctonus tenuissimus*** (Figs. 25-29, 32, 35, 45, 46, 49, 52; tables 1-3): 1♂, BAPC 0606, Zaranik Protectorate, North Sinai governorate, El-Flousiyat Island, 31º07'04"N, 33º26'11"E, 6 m a.s.l., 9-12 August 2000, *leg*. H. El-Hennawy.

Etymology: The specific epithet *minaeus* is derived from the Greek word *Minaios* (Μιναῖος), meaning "Minaean"—a reference to the ancient Minaean people who inhabited southwestern Arabia between the 2nd and 4th centuries BCE. The name also refers to the city of Ma'an in southern Jordan, historically situated along important trade routes and believed to have been settled by Minaean traders and merchants. The epithet is treated as a Latinized adjective.

Diagnosis: Medium to large *Androctonus*, adults 57-76 mm in total length, carapace of male reaching 7.44 mm in length. Colouration basically very dark to blackish brown; pedipalps and legs apically yellowish. Carapace densely granulose with anterior and posterior median carinae strong. Chelicerae with characteristic buthid dentition (Vachon, 1963). Tergites very densely covered by granules of different sizes; I-VI tricarinate, VII pentacarinate. Sternite III without carinae, IV-V with two carinae, VI-VII with four carinae, sternite V with a large smooth patch in adult males. Pectinal tooth counts ranging from 26-28 in males and 23 in the female. Pedipalps long and slender, with hand conspicuously narrower than patella and very weakly carinate; femur L/W 3.93-4.21 in males, 3.89 in the female; patella L/W 3.53-3.68 in males, 3.61 in the female; chela L/W 7.27-7.77 in males, 8.24 in the female; fixed and movable finger of pedipalps with 14-15 rows of granules and marked accessory granules, basal lobe/notch combination absent. Trichobothrial pattern orthobothriotaxic, type A-β (Vachon, 1974, 1975). Metasoma I-III with 10 carinae, IV with 8 carinae, and metasoma V with 5 carinae, most of which are coarsely serrate to crenulate, median lateral carinae complete on I; on II present on posterior three-fourths; on III limited to posterior one-fifth, dorsolateral carinae on segments II-IV with 1-2 enlarged terminal denticles; ventrolateral carinae on segment V with 3-5 acutely flared denticles and anal arch with 3 very poorly defined crenate lobes, all intercarinal spaces densely granulose and forming a clearly reticulate pattern; dorsal surface of I-IV smooth but with large arrowhead-shaped granulose patches medially; lateral surface of metasomal segment V and telson vesicle with a few coarse punctures. Metasoma moderately robust (males with segments I-III wider than long, other segments longer than wide; the female with segment I wider than long, segments II-III as long as wide, other segments longer than wide; all segments wider than deep in both sexes). Telson slender, with vesicle small but globose, and aculeus longer than vesicle. Leg bristle combs well developed on I-III, poorly defined on IV. Tibial spurs absent from I-II;

large on III-IV, prolateral and retrolateral pedal spurs long and slender in all legs. Tarsal claws long and evenly curved.



Figs. 7-8. *Androctonus minaeus* sp. n., male holotype under UV light. 7. Carapace and mesosoma. 8. sternopectinal area and ventral side of mesosoma. (Scale bar: 5 mm).

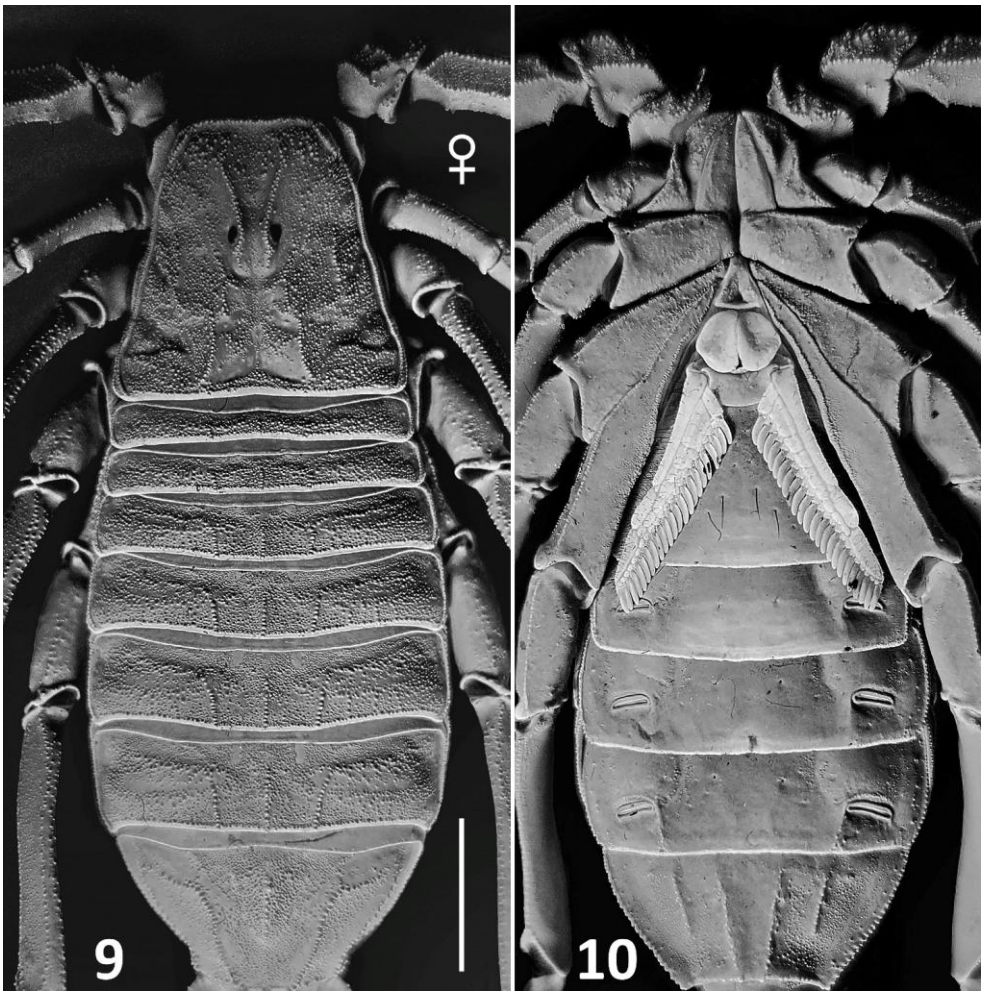
Description: Based on male holotype and paratypes. Measurements are in Table (1).

Colouration. Uniformly dark reddish brown (Figs. 1-6), carapace black to blackish-brown; tergites black to blackish-brown; venter blackish-brown to reddish-brown except sternites IV-V with a median subtriangular smooth pale yellowish patch posteriorly; metasomal segments blackish-brown with all carinae plus the apical portion of all segments infuscate; vesicle blackish-brown to reddish-brown; aculeus dark reddish-brown at the base and dark black at its extremity; chelicerae retrodorsal surface dark yellow to yellowish-brown; prodorsal surface reticulated with dense dark spots; teeth blackish; pedipalps and legs blackish-brown to reddish-brown progressively lighter apically, becoming yellowish, but with all carinae infuscate and dark reticulations between carinae. Chela fingers yellowish; rows of granules on the dentate margins of the fingers dark red. Pectines pale yellow.

Morphology

Prosoma (Figs. 7-10). Anterior margin of carapace slightly concave; all carapace carinae strongly developed, granulose, including central median, posterior median, anterior median, central lateral and central median, but not fused into any particular configuration; intercarinal spaces very densely covered by granules of all sizes; median ocular tubercle

only slightly anterior to the centre of the carapace; median eyes separated by slightly more than two ocular diameters; five pairs of lateral eyes; three large and aligned, plus two small and slightly offset.

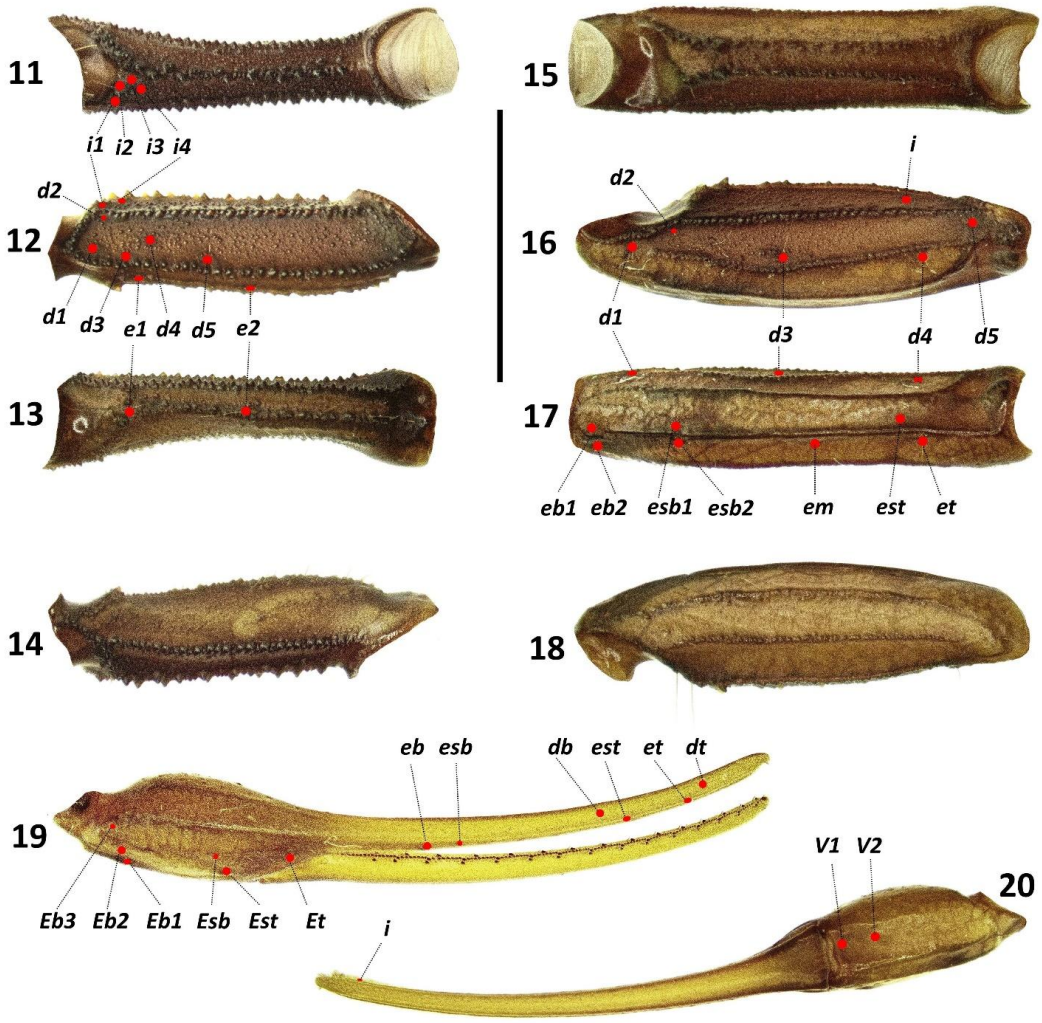


Figs. 9-10. *Androctonus minaeus* sp. n., female paratype under UV light. 9. Carapace and mesosoma. 10. sternopectinal area and ventral side of mesosoma. (Scale bar: 5 mm).

Chelicerae: Dorsal surface of manus smooth, convex, prodorsal margin finely granular with granules arranged in longitudinal ridges; retrodorsal surfaces smooth; prolateral and ventral surfaces densely setose; fingers with normal buthid dentition (Vachon, 1963), fixed finger dorsal and ventral surfaces densely setose, dorsal margin bears 4 teeth: distal, subdistal, median, and basal; ventral margin with basal and median denticles; movable finger dorsal surface smooth; ventral surface densely setose; dorsal margin bears 5 teeth: distal, subdistal, median, and a pair of basal denticles fused in bicusp; ventral margin with distal, median, and basal teeth. The movable finger always ends in two distal teeth – one dorsal and one ventral – between which is inserted the distal tooth of the fixed finger.

Mesosoma (Figs. 7-10). Tergites densely covered by small and medium sized granules. Tergites I-IV tricarinate; all carinae strong, granular; terminating distally on each segment with a spinoid process that extends very slightly beyond the posterior margin of the tergite. Tergite VII with 5 strong, granular carinae; inner and outer lateral carinae joined anteriorly by transverse granule rows; median carinae present on anterior one-half to 2/3 of the total length, moderate to strong. Sternites III-VI smooth, glossy and sparsely

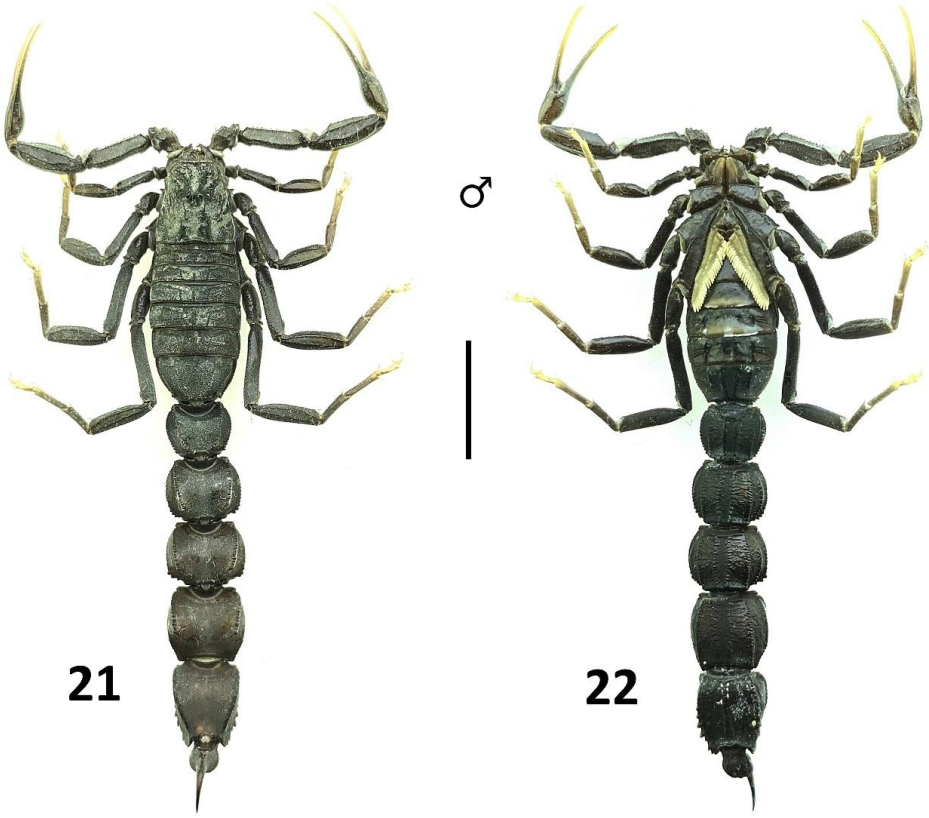
setose, spiracles very elongate and slit-like; Sternites: lateral carinae absent from sternite III; weak to obsolete on IV-VI; strong, crenulate to granulate on VII; median carinae on sternites III-IV obsolete; on VII weak to obsolete. Pectines very long; extending well beyond coxa-trochanter joint of leg IV; pectinal tooth count 26-28 in males. Pectines with 3 marginal lamellae, 8 middle lamellae, marginal and middle lamellae with dense cover of short reddish macrosetae; fulcra with 4-6 setae.



Figs. 11-20. *Androctonus minaeus* sp. n., male holotype. Dextral pedipalp segments with trichobothrial pattern indicated. 11-14. Femur. 15-18. Patella. 19-20. Chela. 11, 15. internal view. 12, 16. dorsal view. 13, 17. external view. 14, 18, 20. ventral view. 19. dorsoexternal view. (Scale bar: 5 mm).

Metasoma (Figs. 31, 34, 37). Metasoma I-III with 10 carinae, IV with 8 carinae, and metasoma V with 5 carinae, most of which are coarsely serrate to crenulate, median lateral carinae complete on I; on II present on posterior three-fourths; on III limited to posterior one-fifth, dorsolateral carinae on segments II-IV with 1-2 enlarged terminal denticles; ventrolateral carinae on segment V with 3-5 acutely flared denticles and anal arch with 3 very poorly defined crenate lobes, all intercarinal spaces densely granulose and forming a clearly reticulate pattern; dorsal surface of I-IV smooth but with a large arrowhead-shaped granulose patches medially; lateral surface of metasomal segment V and telson vesicle with a few coarse punctures. Metasoma moderately robust (males with

segments I-III wider than long, other segments longer than wide; the female with segment I wider than long, segments II-III as long as wide, other segments longer than wide; all segments wider than deep in both sexes).



Figs. 21-22. *Androctonus bicolor*, male from Egypt, habitus under white light. 21. dorsal view. 22. ventral view. (Scale bar: 10 mm).

Telson (Figs. 31, 34, 37). Telson slender, with vesicle small but somewhat globose, aculeus longer than vesicle; subaculear tubercle absent, ventral surface sparsely setose; glossy and essentially smooth, only with some vestiges of coarse granules and punctures, and a poorly defined ventro-median carinae.

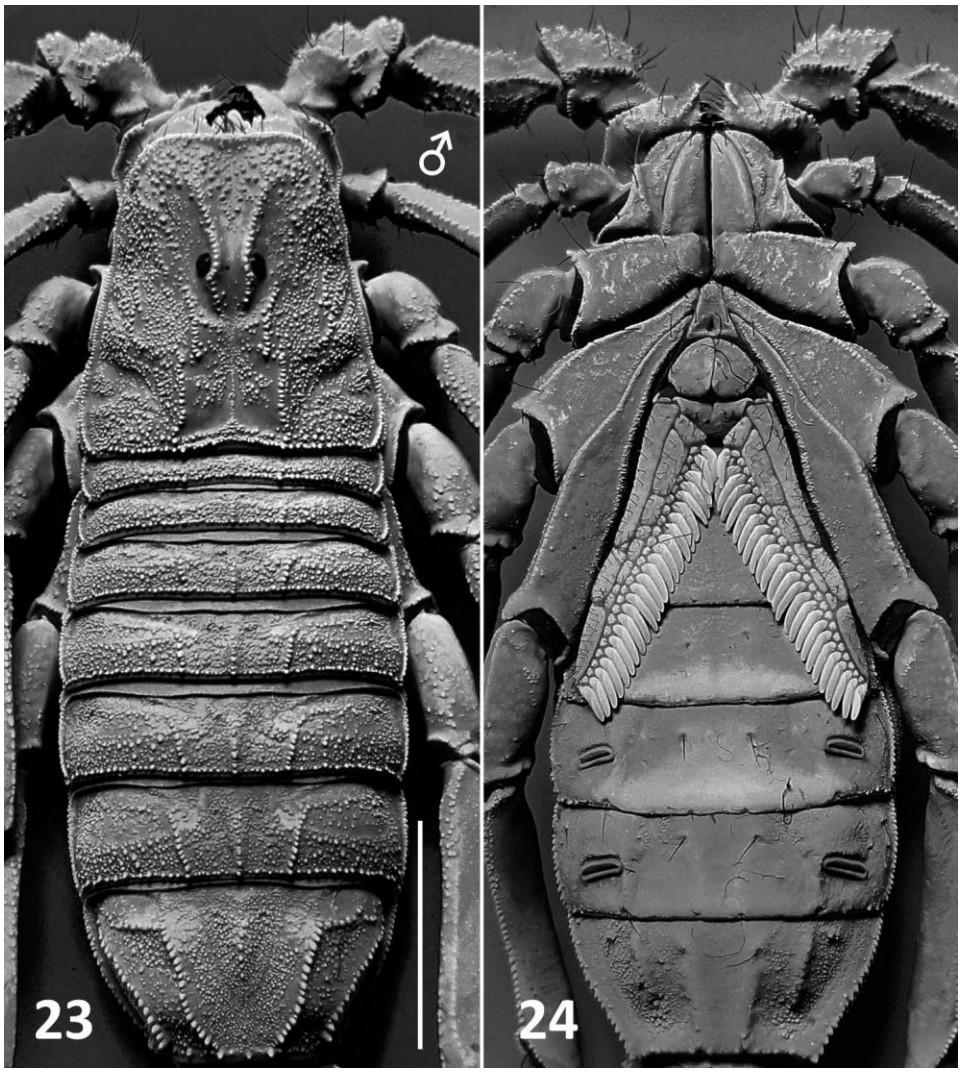
Pedipalps

Femur (Figs. 11-14) slender and straight, L/W= 3.93-4.21; with 5 carinae; dorsoexternal, dorsointernal and ventrointernal carinae strong with regular large conical granules; internal carina strong, with irregular large granules; external carina with isolated large dentate granules; intercarinal surfaces very finely and densely granulose.

Patella (Figs. 15-18) slender, L/W= 3.53-3.68; with 8 carinae; dorsointernal carinae moderate to strong, granular; dorsomedian carina moderate, finely granular; dorsoexternal carina weak, smooth to finely granular; external carina weak, smooth; ventroexternal and ventromedian carinae weak, with fine granules; ventrointernal and internal carinae moderate, with medium to small granules and patellar spur.

Chela (Figs. 19-20). Slender; chela L/W= 7.27-7.77, chela hand narrower than patella; hand width / patella width ratio 0.74-0.79, all carinae almost vestigial, chela fingers long and slender; movable finger L/hand L 2.92-3.04; movable finger L /carapace L 1.27-1.32,

chela fingers evenly curved and without basal lobe/notch combination, dentate margins of fixed and movable fingers composed of 14-15 almost linear rows of granules and conspicuous accessory granules.



Figs. 23-24. *Androctonus bicolor*, male from Egypt under UV light. 23. Carapace and mesosoma. 24. sternopectinal area and ventral side of mesosoma. (Scale bar: 5 mm).

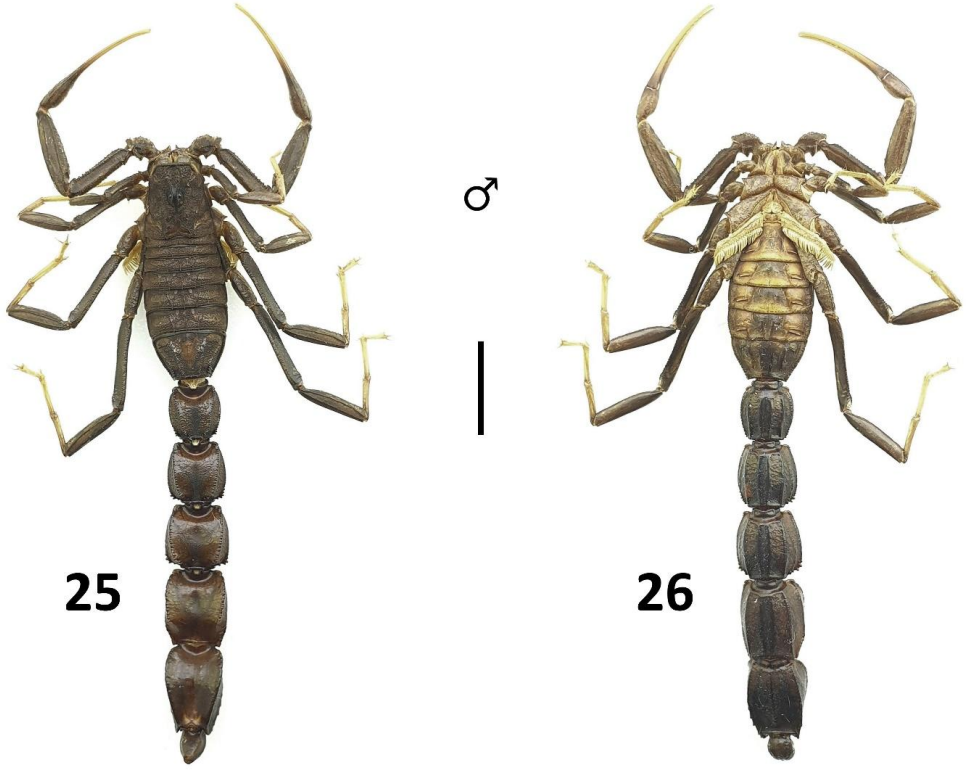
Trichobothrial pattern orthobothriotaxic (Figs. 11-20). type A (Vachon, 1974); dorsal trichobothria of femur in beta configuration (Vachon, 1975); pedipalp chela fixed finger with trichobothrium *db* basal to *est*.

Legs: (Fig. 50). with ventral aspect of tarsi presenting numerous thin setae not well arranged in rows. Bristlecombs well-developed on I-III, poorly defined on IV. Tibial spurs present on legs III and IV strong. Prolateral and retrolateral pedal spurs long and slender in all legs, prolateral spurs basally bifurcate. Claws long and evenly curved.

Affinities

The new species exhibits diagnostic characteristics shared with both *A. bicolor* and *A. tenuissimus*, and is morphometrically intermediate between them across most measured ratios (Tables 2-3).

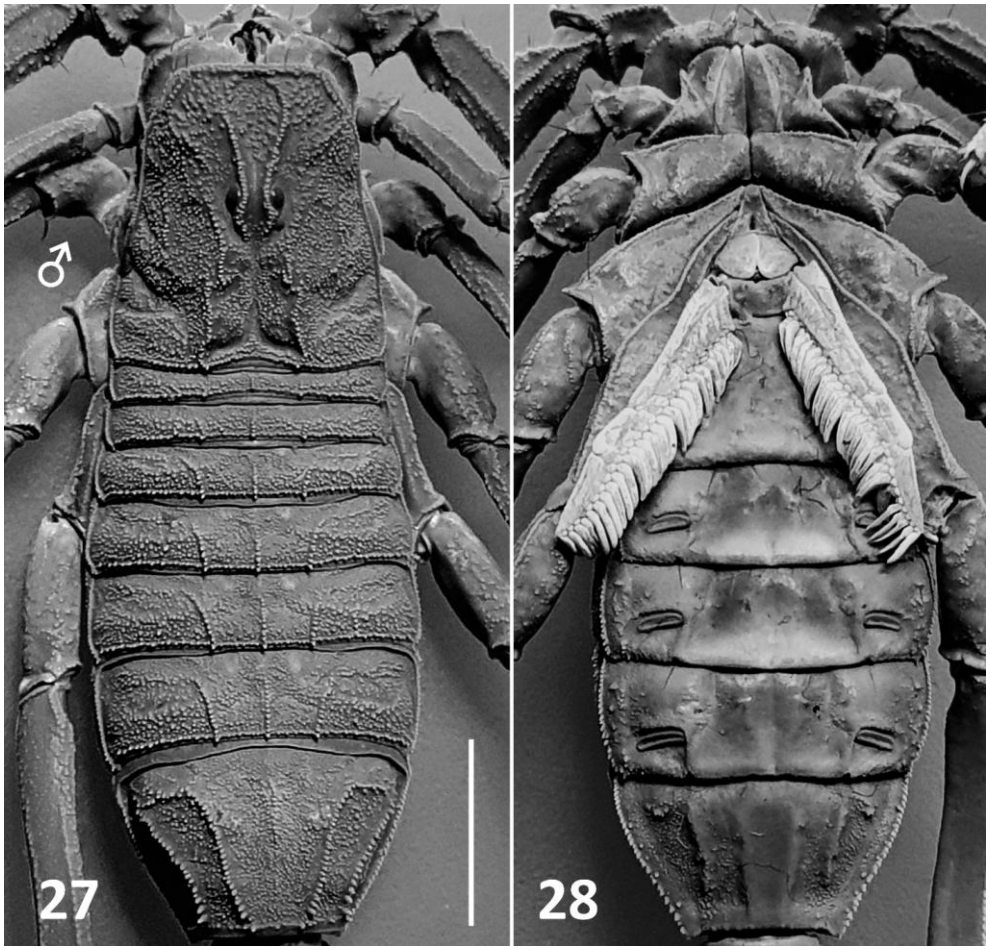
Androctonus minaeus sp. n. can be distinguished from *A. bicolor* by having: **(a).** more slender metasomal segments (Tables 2-3, Figs. 30, 31, 33, 34, 36, 37); **(b).** pedipalps conspicuously more slender, with femur, patella, and chela much longer (Tables 2-3, Figs. 41-44, 47-48); **(c).** different colour pattern, the new species is basically dark reddish-brown, while *A. bicolor* is pitch black; **(d).** lateral inframedian carinae of metasoma II-III less developed; on II present on posterior two-thirds; on III restricted to posterior one-fourth, whereas in *A. bicolor* with almost complete lateral inframedian carinae becomes less defined on the basal portion of II-III; **(e).** the movable finger of chela is relatively longer in the new species; movable finger L/hand L ratio 2.92-3.04; movable finger L / carapace L 1.27-1.32, while in *A. bicolor* movable finger L/hand L ratio 2.23-2.70; movable finger L/carapace L 1.11-1.20; **(f).** the movable finger of chela with 14 subrows (not including the first basal row) of denticles in *Androctonus minaeus* sp. n. (Fig. 47), whereas 13 in *A. bicolor* (Fig. 48); **(g).** tergite VII is more elongated in males of the new species than in *A. bicolor*; tergite VII L/W ratio 0.63-0.69 in *Androctonus minaeus* sp. n., 0.53-0.58 in *A. bicolor*; **(h).** pectines is longer in males of *Androctonus minaeus* sp. n. than in *A. bicolor*; tips of pectines reaching mid-trochanter of leg IV in *Androctonus minaeus* sp. n. (Fig. 8), extending to proximal 1/4 of trochanter IV in *A. bicolor* (Fig. 24).



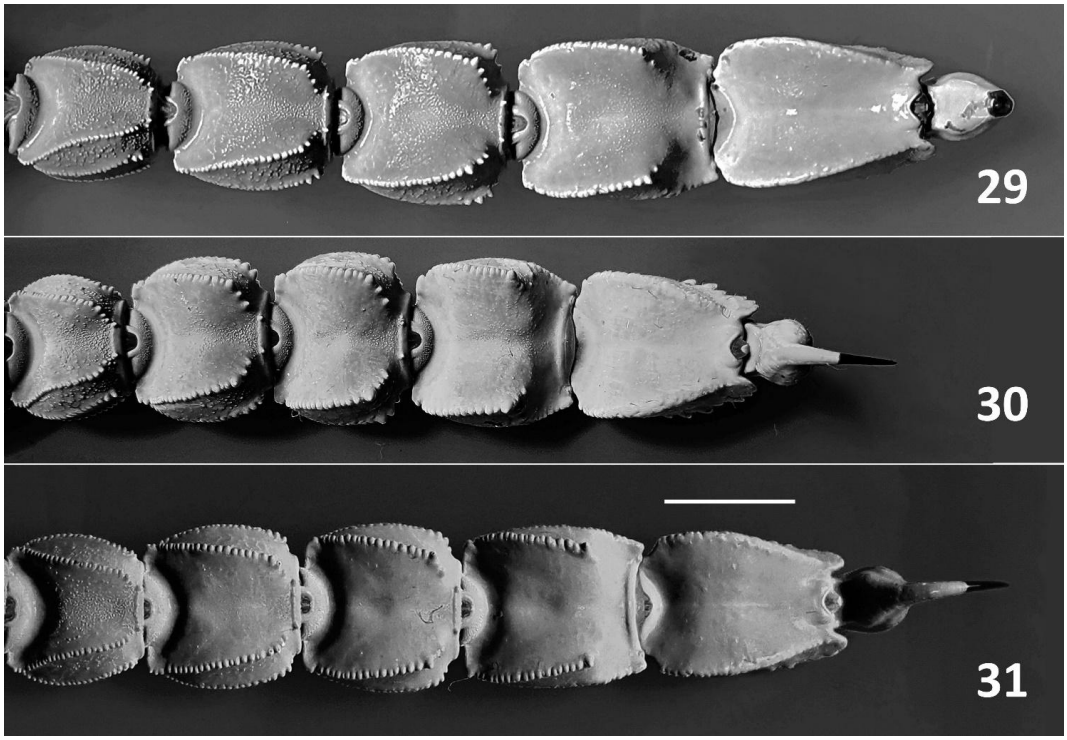
Figs. 25-26. *Androctonus tenuissimus*, male from Egypt, habitus under white light. 25. dorsal view. 26. ventral view. (Scale bar: 10 mm).

Androctonus minaeus sp. n. can be distinguished from *A. tenuissimus* by having: **(a).** robust metasomal segments (Table 2, Figs. 29, 31, 32, 34, 35, 37); metasomal segment II wider than long in males of the new species, while longer than wide in *A. tenuissimus*; **(b).** pedipalp chela less slender in males of the new species; pedipalp chela L/W 7.27-7.77 in *Androctonus minaeus* sp. n.; 7.87-8.20 in *A. tenuissimus* (Table 2, Figs. 47, 49); **(c).** Vesicle of telson is less elongated (Tables 2-3); in males vesicle L/W

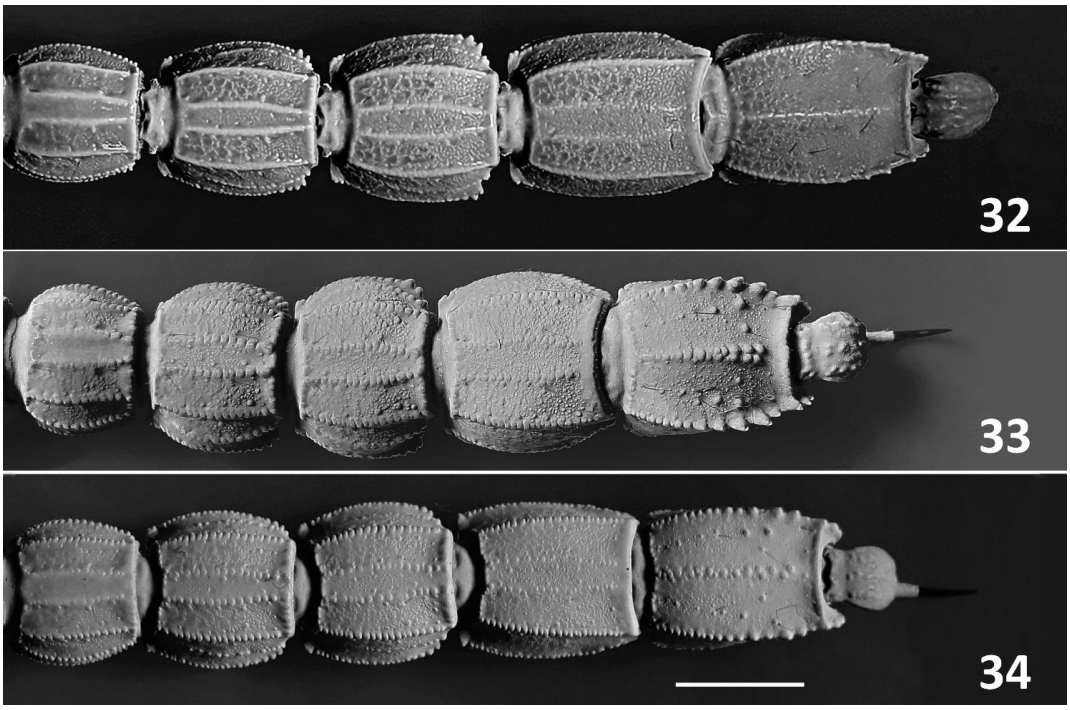
1.20-1.29; L/D 1.44-1.59, whereas in males of *A. tenuissimus* vesicle L/W 1.52-1.58; L/D 1.90-1.95; in the female of the new species vesicle L/W 1.21; L/D 1.59, whereas in females of *A. tenuissimus* vesicle L/W 1.38-1.55; L/D 1.71-1.92; **(d).** ventrolateral carinae of metasoma V with enlarged triangular or subtriangular denticles distally (Fig. 37), whereas in *A. tenuissimus* ventrolateral carinae of metasoma V with slightly enlarged subtriangular denticles (Fig. 35); **(e).** ventromedian carina of metasoma V strong, armed with medium to large granules (Fig. 34), whereas in *A. tenuissimus* ventromedian carina of metasoma V weak (Fig. 32); **(f).** ventrolateral carinae on metasoma I-IV strong, crenulate (Fig. 34), while in *A. tenuissimus* weak, smooth (Fig. 32); **(g).** ventral submedian carinae on I-IV moderate to strong, granular (Fig. 34), whereas in *A. tenuissimus* weak, smooth (Fig. 32); **(h).** the movable finger of chela is relatively shorter in males of the new species; movable finger L/hand L ratio 2.92-3.04; movable finger L /carapace L 1.27-1.32, while in *A. tenuissimus* movable finger L/hand L ratio 3.07-3.10; movable finger L/carapace L 1.35-1.37; **(i).** vesicle of telson is less elongated in males of the new species; vesicle L/W 1.20-1.29; vesicle L/D 1.44-1.59, while in *A. tenuissimus* vesicle L/W 1.52-1.58; vesicle L/D 1.90-1.95; **(j).** tarsal claws are relatively shorter and more curved in males of *Androctonus minaeus* sp. n. (Fig. 50), than in *A. tenuissimus* (Fig. 52); **(k).** granulations form a less pronounced reticulate pattern on lateral and ventral surfaces of metasoma in *Androctonus minaeus* sp. n. (Fig. 34) than in *A. tenuissimus* (Fig. 32).



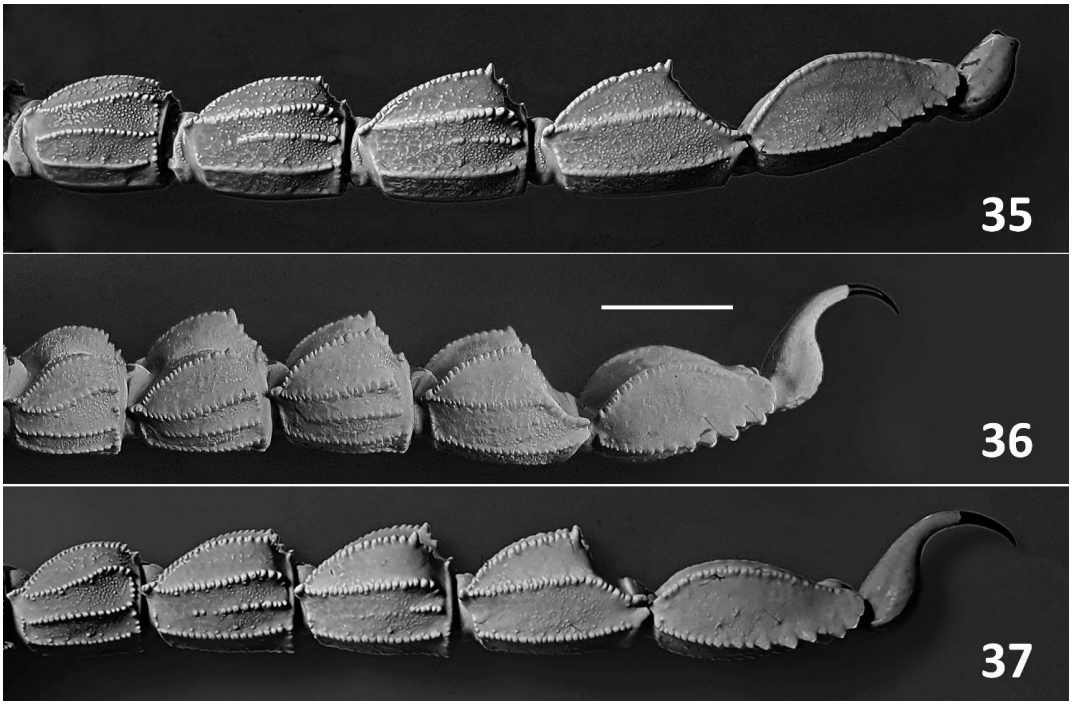
Figs. 27-28. *Androctonus tenuissimus*, male from Egypt under UV light. 27. Carapace and mesosoma. 28. sternopectinal area and ventral side of mesosoma. (Scale bar: 5 mm).



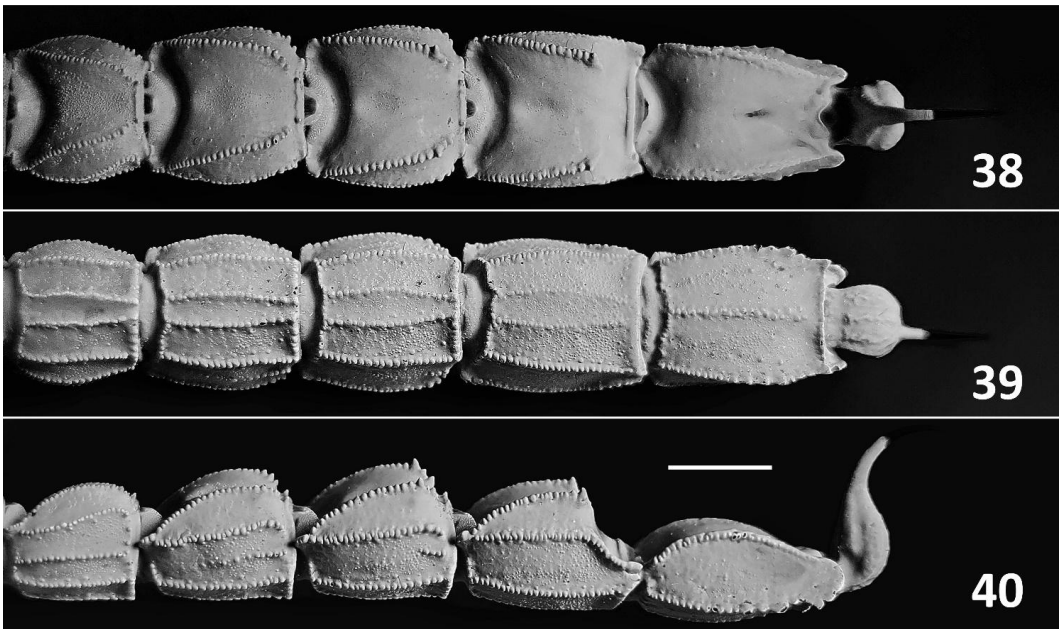
Figs. 29-31. Males of *Androctonus* spp., metasoma and telson under UV light in dorsal view. 29. *Androctonus tenuissimus*. 30. *Androctonus bicolor*. 31. *Androctonus minaeus* sp. n. (Scale bar: 5 mm).



Figs. 32-34. Males of *Androctonus* spp., metasoma and telson under UV light in ventral view. 32. *Androctonus tenuissimus*. 33. *Androctonus bicolor*. 34. *Androctonus minaeus* sp. n. (Scale bar: 5 mm).



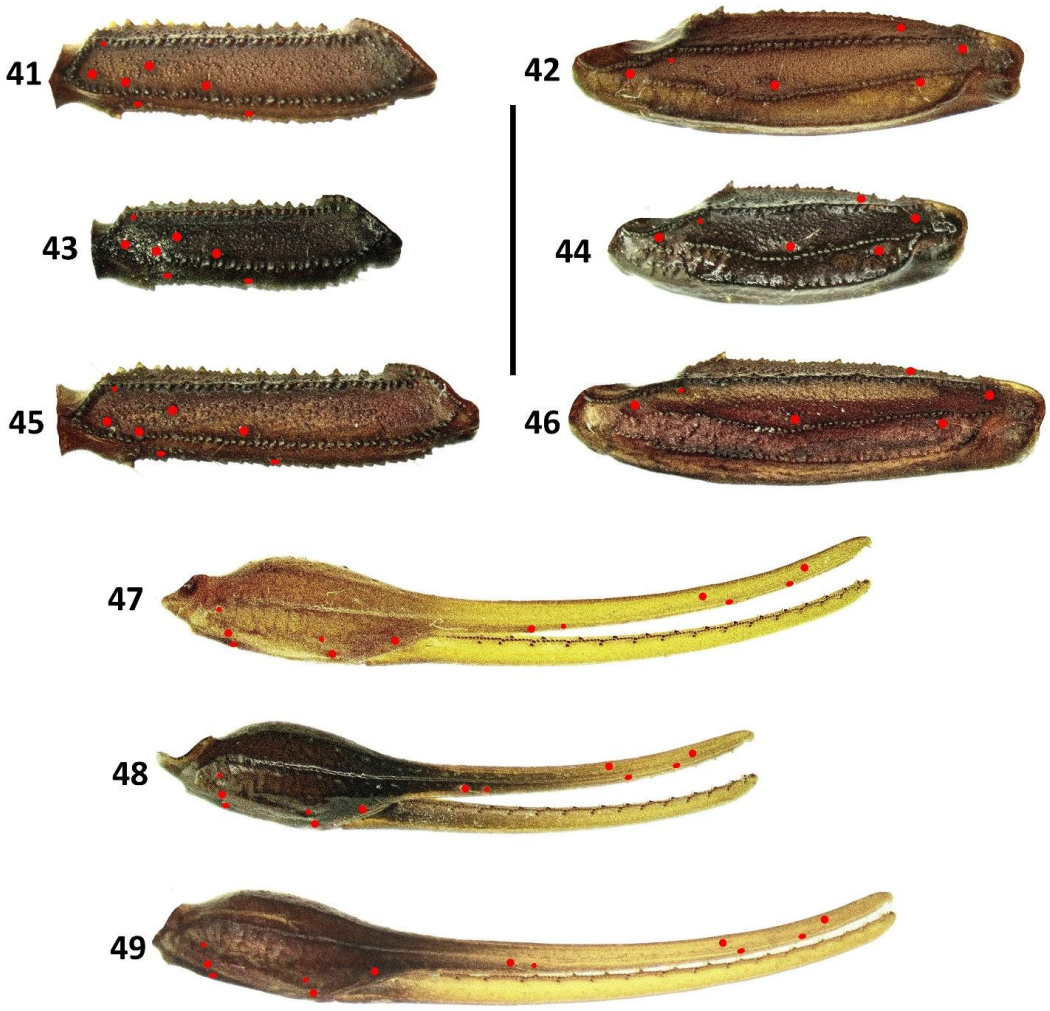
Figs. 35-37. Males of *Androctonus* spp., metasoma and telson under UV light in lateral view. 35. *Androctonus tenuissimus*. 36. *Androctonus bicolor*. 37. *Androctonus minaeus* sp. n. (Scale bar: 5 mm).



Figs. 38-40. *Androctonus minaeus* sp. n., female paratype. Metasoma and telson under UV light, in dorsal (38), ventral (39), and lateral (40) views. (Scale bar: 5 mm).

Notes on the closely related species *Androctonus turieli* Teruel & Kovařík, 2014 (now considered a junior synonym of *A. aeneas* C.L. Koch, 1839 sensu Lourenço *et al.*, 2015), which was known only from females, indicate that it can be distinguished from the female of the new species by several morphological traits: (a) more robust metasomal segments (Table 3), with metasomal segments II-III wider than long in *A. turieli*, compared to as long as wide in the female of *Androctonus minaeus* sp. n.;

(b) conspicuously less slender pedipalp segments, with the femur, patella, and chela shorter and stouter (Table 3); and (c) a relatively shorter chela movable finger, with a movable finger L/hand L ratio of 2.50-2.81 and movable finger L/carapace L ratio of 1.07-1.11, while in *A. minaeus* sp. n. these ratios are 2.94 and 1.30, respectively.



Figs. 41-49. Dextral pedipalp segments of males of *Androctonus* spp. under white light, with trichobothrial pattern indicated. 41, 43, 45. Femur, dorsal view. 42, 44, 46. Patella, dorsal view. 47-49. Chela, dorsoexternal view. 41, 42, 47. *Androctonus minaeus* sp. n. 43, 44, 48. *Androctonus bicolor*. 45, 46, 49. *Androctonus tenuissimus*. (Scale bar: 5 mm).

Habitat

The new species *Androctonus minaeus* sp. n. appears to have a restricted distribution in Jordan, particularly when compared to the more widespread *Androctonus ammoneus* Yağmur, Al-Saraireh & Abu Afifeh, 2025. The latter is commonly found across a range of habitats, with notable abundance in the eastern desert, Wadi Araba, and Wadi Rum. It has also been recorded in Mediterranean climatic zones, including higher-altitude regions that experience relatively high annual rainfall. In contrast, *A. minaeus* sp. n. seems to be confined to the western highlands of Ma'an governorate—an area characterized by elevations exceeding 1200 meters above sea level. These mountainous

zones likely offer ecological conditions that support localized scorpion populations and may serve as refugia, promoting endemism due to their relative isolation and distinct microhabitats.

Figs. 50-52. Tibia, basitarsus, and telotarsus of right leg IV under white light, retrolateral aspect, males. 50. *Androctonus minaeus* sp. n. 51. *Androctonus bicolor*. 52. *Androctonus tenuissimus*. (Scale bar: 1 mm).

Our specimen of *A. tenuissimus* was collected from the Zaranik Protected Area (El-Hennawy, 2005) implies consideration of prospects of expanding the area to cover the whole area of Lake Bardawil and keeping Zaranik as its core. Lake Bardawil is a prominent landform feature of North Sinai, a saltwater wetland that retains most of its pristine ecology. The Bardawil area is a part of the Mediterranean coastal lands of Egypt. Its prevalent climate belongs to the dry lands of the southern Mediterranean (low winter rainfall: less than 200 mm/year). For the landform set-up, it is a coastal lagoon with access to the sea through a set (three) natural and man-made inlets: all need maintenance to keep them functioning. The lagoon is hypersaline, seawater prevails, it receives little seepage of underground fresh water and limited rainfall and no agricultural drainage (compared to other Delta coastal lakes that receive considerable volumes of semi-fresh water debouched by agricultural drains) (Kassas in Khalil & Shaltout, 2006).

On the contrary, the comparative *A. bicolor* was collected from the arid Mediterranean region of Marsa Matrouh. Marsa Matrouh's ecology is characterized by a dry-summer hot desert climate with Mediterranean influences, resulting in moderately hot summers and mild, wet winters. The area features a coastal ecosystem with beaches and shallow, hypersaline waters.

A map illustrating the collecting localities of all specimens examined in this study—including *A. minaeus* sp. n., *A. tenuissimus*, and *A. bicolor*—is presented in Fig. (53). Providing that *A. tenuissimus* was originally described from Egypt's Matruh Province, but without a precise locality, while the type locality and composition of the original type series of *A. bicolor* remain uncertain (Teruel & Kovařík, 2014). And to provide broader context, we have included on the map previous records of *A. bicolor* and *A. tenuissimus* based on El-Hennawy (1992) and Badry *et al.* (2017). However, these historical records require further precise taxonomic assessment and verification for

definitive identification. Moreover, the original specimens cited in these works were not available to us for re-examination. The new records documented here enhance our understanding of the distribution of these species in Egypt and notably extend the known range of *A. tenuissimus* eastward to the Sinai Peninsula.

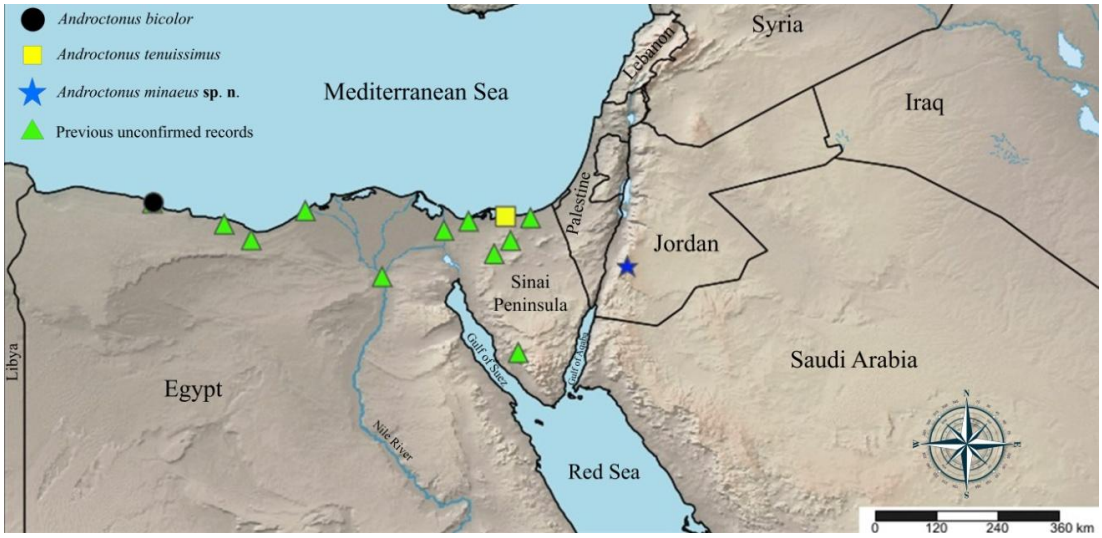


Fig. 53. Map showing the collecting localities of *Androctonus minaeus* sp. n. (Ma'an governorate, Jordan), *Androctonus bicolor* (Marsa Matrouh, Egypt), and *Androctonus tenuissimus* (Zaranik Protectorate, North Sinai, Egypt) used in this study. In addition to the previous records of *A. bicolor* and *A. tenuissimus* from Egypt.

Discussion

A recent taxonomic revision of the traditional records of *Androctonus crassicauda* (Olivier, 1807) in Jordan revealed the presence of a new widely distributed species; *A. ammoneus*. Furthermore, the validity of some historical records of *Androctonus* species from Jordan remains uncertain and warrants critical re-evaluation. Notably, Seiter & Turiel (2013) cited the presence of *Androctonus australis* (Linnaeus, 1758) in Jordan, however, this record lacks voucher specimens, locality precision, and diagnostic morphological data. Considering that *A. australis* is primarily distributed in North Africa and the western Sahara, its inclusion in Jordan's fauna is likely erroneous. Similarly, the earlier report of *Androctonus amoreuxi* (Audouin, 1825) by Kinzelbach (1985) followed by Amr & Al-Oran (1994) lacks conclusive diagnostic justification and may represent a misidentification of morphologically similar species. Furthermore, the earliest records of *A. bicolor* in Jordan—reported by Kinzelbach (1984, 1985) from Aqaba—also lack critical morphological or morphometric justification. In light of these deficiencies in documentation and diagnostic evidence, these records should be regarded as unverified and excluded from the confirmed scorpion fauna of Jordan pending further evidence.

This study addresses those limitations by conducting detailed morphometric and morphological comparisons with *A. bicolor* and *A. tenuissimus*, using specimens from Egypt as reference material. The new species shares intermediate traits with both taxa but can be consistently differentiated through several distinct features, including metasomal and pedipalp proportions, dentition pattern, and carinal development. The variation in morphometric ratios across multiple characters—particularly the chela proportions and telson structure—supports the taxonomic distinctiveness of *A. minaeus* sp. n.

Table 1. Measurements for adult males and female of *Androctonus minaeus* sp. n., *Androctonus bicolor*, and *Androctonus tenuissimus*. Measurements and morphometrics are in mm. (L: Length, W: Width, D: Depth, AW: Anterior width, PW: Posterior width).

Measurements (mm)	*Androctonus minaeus* sp. n.					*Androctonus bicolor*	*Androctonus tenuissimus*
	♂ holotype BAPC 0600	♂ paratype BAPC 0601	♂ paratype BAPC 0602	♂ paratype BAPC 0603	♀ paratype BAPC 0604	♂ BAPC 0605	♂ BAPC 0606
Total length	**66.44**	**62.65**	**59.30**	**57.85**	**76.60**	**54.50**	**66.70**
Carapace L	7.44	7.32	6.72	6.60	9.24	6.84	7.56
Carapace AW/PW	3.96/7.32	3.72/7.32	3.60/6.84	3.36/6.60	4.92/9.96	3.84/6.60	3.96/7.26
Mesosoma L	17.53	16.57	16.57	14.77	19.45	13.21	15.01
Metasoma I L/W	5.04/5.52	4.92/5.40	4.56/5.04	4.44/4.80	6.24/6.66	4.44/5.40	5.28/5.28
Metasoma II L/W	5.76/6.06	5.64/6.00	5.28/5.46	5.16/5.28	7.20/7.20	5.16/6.24	6.24/6.00
Metasoma III L/W	5.95/6.24	5.88/6.30	5.64/5.76	5.28/5.64	7.56/7.56	5.40/6.60	6.60/6.60
Metasoma IV L/W	7.08/6.12	6.96/6.24	6.60/5.70	6.12/5.52	8.76/7.32	6.36/6.48	7.80/6.36
Metasoma V L/W/D	7.92/5.46/3.60	7.56/5.40/3.84	7.08/4.86/3.60	6.96/4.92/3.36	9.60/6.36/4.68	7.02/5.52/3.84	8.64/5.88/3.96
Telson L	6.72	6.84	6.24	6.12	8.88	5.88	- (Aculeus broken)
Vesicle L/W/D	3.24/2.52/2.04	3.12/2.52/2.16	2.88/2.40/1.98	2.88/2.28/1.92	4.20/3.48/2.64	2.64/2.46/2.04	3.60/2.64/2.16
Pedipalp Femur L/W	7.20/1.80	7.08/1.68	6.60/1.68	6.36/1.56	8.88/2.28	5.76/1.68	7.80/1.80
Pedipalp Patella L/W	8.40/2.28	8.04/2.22	7.44/2.10	7.20/2.04	9.96/2.76	6.72/2.16	8.76/2.28
Pedipalp Chela L/W/D	13.09/1.80/2.04	13.03/1.68/1.80	12.12/1.56/1.68	11.40/1.44/1.68	16.81/2.04/2.28	11.04/1.68/1.92	13.69/1.68/1.92
Hand L	3.12	3.12	3.00	2.88	4.08	3.00	3.12
Movable finger L	9.48	9.48	8.88	8.40	12.00	7.44	10.20
Tergite VII L/W	4.92/7.08	4.80/7.56	4.56/7.20	4.44/7.08	5.40/10.44	3.60/6.72	4.92/7.32

The restricted distribution of *A. minaeus* sp. n. in the high-altitude mountainous zones of Ma'an governorate further suggests ecological specialization or historical isolation that may have facilitated speciation. These montane areas are biogeographically distinct from the arid lowlands where *A. ammoneus* is widespread. This contrast in habitat preferences may reflect niche differentiation among sympatric or parapatric *Androctonus* lineages and aligns with patterns of microendemism documented in other scorpion taxa in the region (Al-Saraireh *et al*., 2021; Abu Afifeh *et al.*, 2022, 2024; Cain *et al.*, 2021).

The inclusion of Egyptian material was instrumental in evaluating the taxonomic boundaries among morphologically similar species. *A. tenuissimus*, for example, although superficially resembling *A. bicolor*, shows consistent morphological traits that justify its recognition as a separate species.

The synonymization of *A. turieli* with *A. aeneas* (Lourenço *et al.*, 2015), while outside the primary scope of this study, underscores the ongoing challenges in delimiting species boundaries within *Androctonus*. The case of *A. turieli*, known only from females, illustrates the potential for underestimating intraspecific variation or prematurely erecting new taxa based on limited material. In contrast, the comprehensive diagnosis of *A. minaeus* sp. n. benefits from a more robust comparative framework and includes both sexes, enhancing the reliability of the species delineation.

In conclusion, this study contributes significantly to the understanding of scorpion diversity in Jordan and the broader Middle East. It provides a robust taxonomic framework for distinguishing *A. minaeus* sp. n. from morphologically similar taxa, underscores the importance of integrating comparative material from neighbouring countries, and highlights the need for continued fieldwork and revisionary studies in regions where historical records remain unresolved.

Table 2. Variation in morphometric ratios and meristics for adult males of *Androctonus minaeus* sp. n., *Androctonus bicolor*, and *Androctonus tenuissimus*.

	Androctonus minaeus sp. n. BAPC 0600-0603	*Androctonus bicolor* BAPC 0605	*Androctonus bicolor* (After Teruel *et al.*, 2013)	*Androctonus tenuissimus* BAPC 0606	*Androctonus tenuissimus* (After Teruel *et al.*, 2013)
	♂ (n=4)	♂ (n=1)	♂	♂ (n= 1)	♂ (n=2)
Total length (mm)	57.85 – 66.44	54.50	60.70 – 67.80 (n=7)	66.70	65.30 –71.60
Metasoma I L/W	0.90 – 0.93	0.82	0.80 – 0.82 (n=7)	1.00	0.94 – 0.96
Metasoma II L/W	0.94 – 0.98	0.83	0.77 – 0.81 (n=7)	1.04	1.02
Metasoma III L/W	0.93 – 0.98	0.82	0.73 – 0.76 (n=7)	1.00	0.97 – 0.98
Metasoma IV L/W	1.11 – 1.16	0.98	0.92 – 0.96 (n=7)	1.23	1.18 – 1.19
Metasoma V L/W	1.40 – 1.46	1.27	1.10 – 1.16 (n=7)	1.47	1.40 – 1.42
Vesicle L/W	1.20 – 1.29	1.12	1.25 – 1.35 (n=7)	1.50	1.52 – 1.58
Vesicle L/D	1.44 – 1.59	1.35	1.59 – 1.67 (n=7)	1.83	1.90 – 1.95
Pedipalp femur L/W	3.93 – 4.21	3.43	3.11 – 3.44 (n=7)	4.33	3.88 – 4.47
Pedipalp patella L/W	3.53 – 3.68	3.11	2.85 – 3.04 (n=7)	3.84	3.62
Pedipalp chela L/W	7.27 – 7.77	6.57	6.10 – 6.16 (n=7)	8.15	7.87 – 8.20
chela L / Movable finger L	1.36 – 1.38	1.48	1.37 – 1.38 (n=7)	1.34	1.32 – 1.33
Movable finger L/hand L	2.92 – 3.04	2.48	2.23 – 2.70 (n=3) Teruel & Kovařík (2014)	3.27	3.07 – 3.10
Movable finger L /carapace L	1.27 – 1.32	1.09	1.11 – 1.20 (n=3) Teruel & Kovařík (2014)	1.35	1.35 – 1.37
Pectine teeth	26 – 28	25 – 26	24 – 28 Teruel & Kovařík (2014)	27 – 29	27 – 28
Pedipalp movable finger denticle subrows	14	13	13 – 14	14	14 – 15
Tergite VII L/W	0.63 – 0.69	0.54	0.53 – 0.58 (n=3) Teruel & Kovařík (2014)	0.67	0.58 – 0.62

Acknowledgments

We are sincerely grateful to Mr. Mohammad Nuaimat for his generous assistance and companionship during fieldwork in the Ma'an region. Our thanks also go to the kind and welcoming people of Ma'an, whose support and hospitality made the field efforts both possible and memorable. Their local knowledge and cooperation were invaluable throughout the study.

Table 3. Variation in morphometric ratios and meristics for adult females of *Androctonus minaeus* sp. n., *Androctonus bicolor*, *Androctonus tenuissimus*, and *Androctonus turieli*.

	Androctonus minaeus sp. n. BAPC 0604	*Androctonus bicolor* (After Teruel *et al.*, 2013)	*Androctonus tenuissimus* (After Teruel *et al.*, 2013)	*Androctonus turieli* (After Teruel & Kovařík, 2014)
	♀ (n=1)	♀ (n=9)	♀ (n=6)	♀ (n=3)
Total length (mm)	76.60	64.2 – 80.9 (n=9)	62.70 – 86.50 (n=6)	73.50 – 87.70
Metasoma I L/W	0.94	0.80 (n=9)	1.02 (n=6)	0.87 – 0.88
Metasoma II L/W	1.00	0.76 – 0.87 (n=9)	1.02 – 1.08 (n=6)	0.90 – 0.91
Metasoma III L/W	1.00	0.78 – 0.79 (n=9)	1.01 – 1.07 (n=6)	0.91 – 0.93
Metasoma IV L/W	1.20	0.96 – 0.97 (n=9)	1.17 – 1.31 (n=6)	1.10 – 1.17
Metasoma V L/W	1.51	1.07 – 1.23 (n=9)	1.38 – 1.63 (n=6)	1.24 – 1.35
Vesicle L/W	1.21	1.28 – 1.29 (n=9)	1.38 – 1.55 (n=6)	NA
Vesicle L/D	1.59	1.52 – 1.71 (n=9)	1.71 – 1.92 (n=6)	NA
Total (L) / Pedipalp (L)	2.15	2.35 – 2.61 (n=9)	2.26 – 2.49 (n=6)	2.48 – 2.88 (n=2)
Pedipalp femur L/W	3.89	3.20 – 3.27 (n=9)	4.05 – 4.40 (n=6)	3.36 – 3.41
Pedipalp patella L/W	3.61	2.84 – 3.08 (n=9)	3.71 – 4.04 (n=6)	3.07 – 3.18
Pedipalp chela L/W	8.24	5.76 – 6.45 (n=9)	7.74 – 8.32 (n=6)	5.48 – 5.54
chela L / Movable finger L	1.40	1.36 – 1.38 (n=9)	1.31 – 1.32 (n=6)	1.36 – 1.40
Movable finger L/hand L	2.94	2.79 – 3.03 (n=3)	3.14 – 3.27 (n=4)	2.50 – 2.81 (n=2)
Movable finger L /carapace L	1.30	1.12 – 1.23 (n=3)	1.32 – 1.41 (n=4)	1.07 – 1.11 (n=2)
Pectine teeth	23 – 23	19 – 22	21 – 23	21 – 23
Pedipalp movable finger denticle subrows	14 – 15	13 – 14	14 – 15	14 – 15
Tergite VII L/W	0.52	0.51 – 0.55 (n=3)	0.56 – 0.60 (n=4)	0.54 – 0.55 (n=2)

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On the morphology of *Orthochirus negebensis* Shulov & Amitai, 1960 (Scorpiones: Buthidae)

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Abstract

The morphology of the scorpion *Orthochirus negebensis* Shulov & Amitai, 1960 is examined and illustrated based on both sexes in this study. The examined specimens were collected from Sinai, Egypt. Detailed colour and UV-light-illuminated photographs are provided.

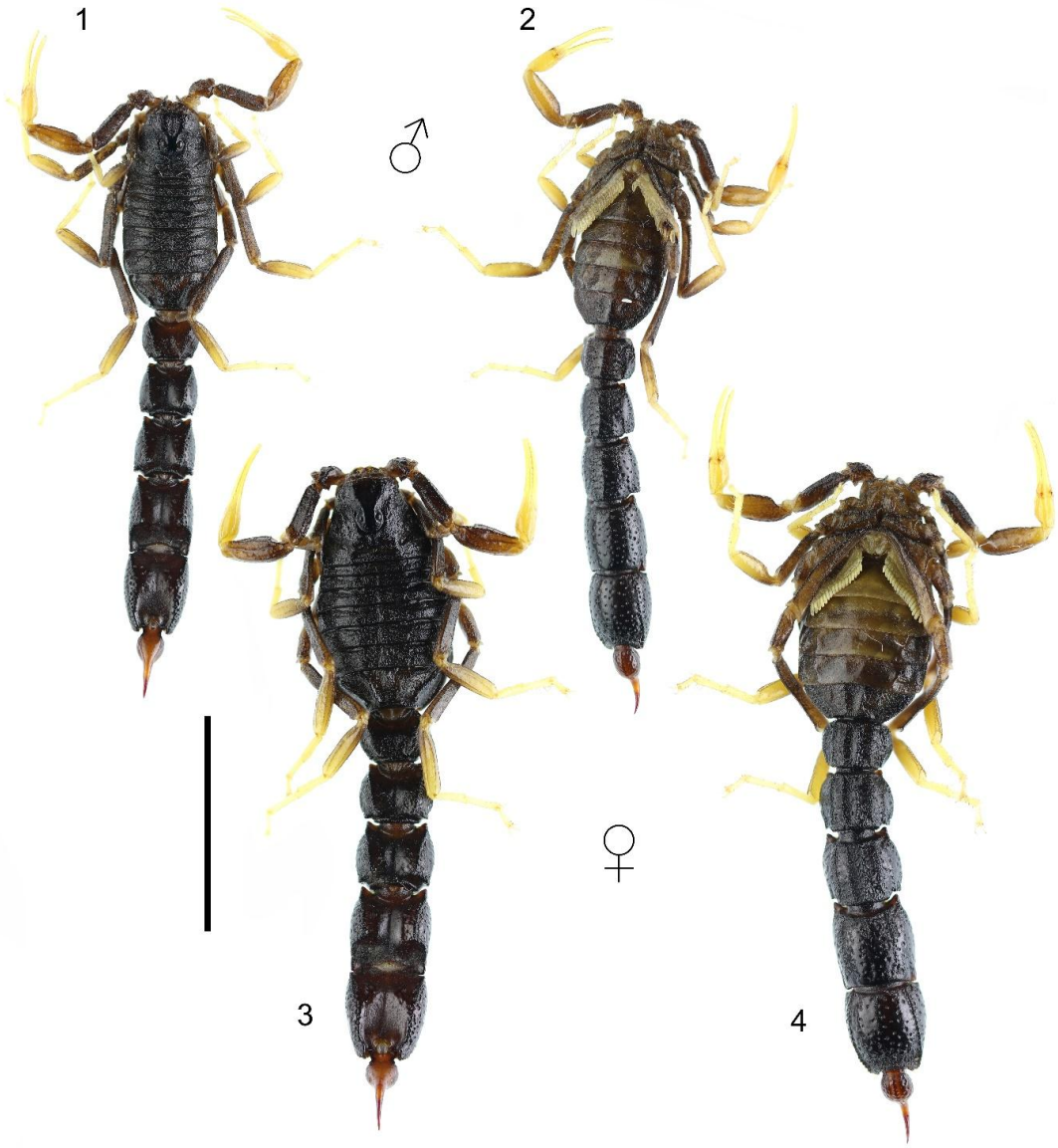
Keywords: Scorpiones, Buthidae, *Orthochirus negebensis*, Egypt.

Introduction

Orthochirus negebensis Shulov & Amitai, 1960 was originally described as *Orthochirus innesi negebensis* from Wadi Nafha, Central Negev by Shulov & Amitai (1960). Later, Levy & Amitai (1980) indicated that Asian populations of *Orthochirus* are more closely related to *O. scrobiculosus* rather than *O. innesi* and classified this taxon as a subspecies of *O. scrobiculosus*. In addition, Levy & Amitai (1980) reported this species from Sinai (Egypt) and Jordan. Kovařík (2004) questioned the subspecific position of the populations occurring between Egypt and Syria under *O. innesi* and suggested that these populations may represent a separate species. Amr *et al.* (2016) reported populations of *O. scrobiculosus negebensis* from western Jordan, while Kovařík & Whitman (2004) identified some specimens from Wadi Rum as *O. innesi*. Lourenço (2007) elevated this taxon to species rank and accepted it as valid. Finally, Kovařík *et al.* (2020) suggested that the distribution of *O. scrobiculosus* was limited exclusively to Turkmenistan. Highlighting the general need for

more clarity within the genus, Algahtani & Badry (2021) later emphasized that all species belonging to this genus require additional morphological and molecular investigation. This call for further study was partly addressed when Kovařík & Just (2022) described a new species, *O. katerinae*, from Saudi Arabia. More recently, Ythier & Lourenço (2023) described a new species *O. arabicus* from the Mahazat as-Sayd Reserve, in the centre of the country. In the same work, they also validated the species-level status of *O. negebensis* and provided a detailed comparison between *O. katerinae* and *O. negebensis*.

In this paper, we aim to highlight the morphological characteristics of *O. negebensis* and provide both colour and UV-light-illuminated photographs.



Figs. 1-4. *Orthochirus negebensis* from Sinai, habitus. 1-2. Male. 3-4. Female. 1,3. Dorsal view. 2,4. Ventral view. (Scale bar: 10 mm).

Material and Methods

Specimens of *Orthochirus negebensis* were collected during daytime under stones in Sinai (Egypt) in August 2016. The collected scorpions were preserved in 96% alcohol. Identification of specimens of *O. negebensis* were after Levy & Amitai (1980).

Photographs were taken by Canon EOS 7D. Stacking of pictures was made using Helicon Focus software. The Illustration method under UV illumination is after Volschenk (2005). The trichobothrial nomenclature is after Vachon (1974) and morphological nomenclature after Francke (1977), Stahnke (1970), and Hjelle (1990). Specimens were deposited in Alaşehir Zoological Museum, Manisa Celal Bayar University, Alaşehir, Manisa, Türkiye.

Results

Family **Buthidae** C.L. Koch, 1837
Genus ***Orthochirus*** Karsch, 1891
Orthochirus negebensis Shulov & Amitai, 1960
Figs. 1-39, Table 1

Type Material: Syntypes, 1♀ Wadi Nafha, Cenral Negev, Hebrew University, Jerusalem, (HU 86); 1♂, Ein Boqeq, Cenral Negev (?HU).

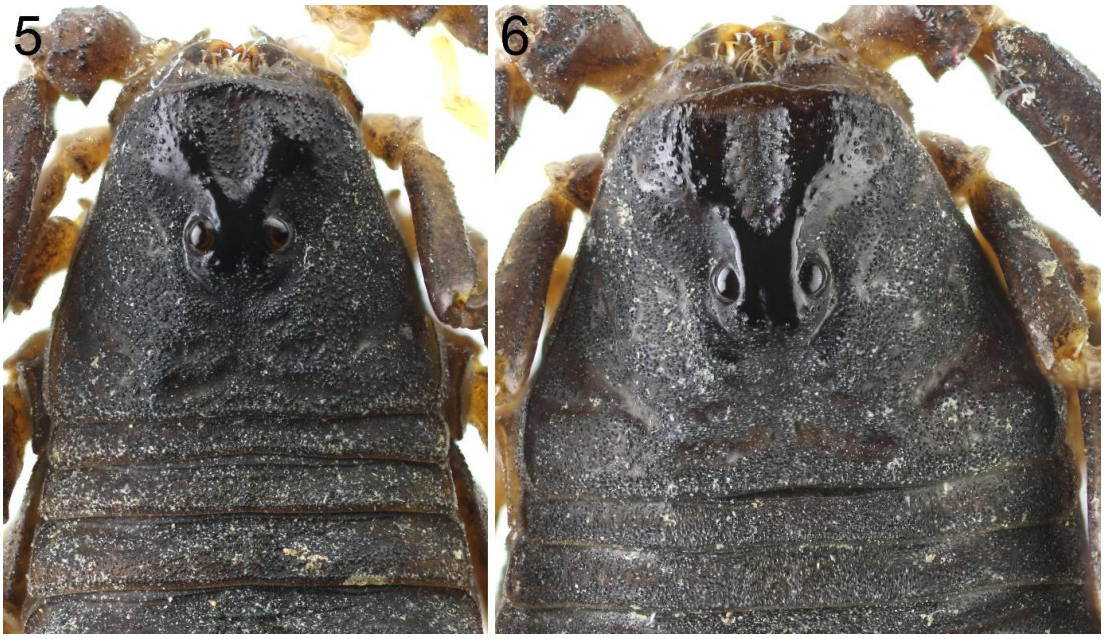
Synonyms
Orthochirus innesi negebensis Shulov & Amitai, 1960: 117-129, figs. 1-3.
Orthochirus innesi negebensis: Vachon, 1966: 213; Vachon, 1979: 55; Hendrixson, 2006: 91.
Orthochirus scrobiculosus negebensis: Levy & Amitai, 1980: 94-101, figs. 86-90, map 7; El-Hennawy, 1992: 99, 130; Fet, 1994: 530; Kovařík, 1998: 116; Kovařík, 2004: 7; Hendrixson, 2006: 91.
Orthochirus negebensis: Lourenço, 2007: 474, 477, fig. 3; Kovařík & Just, 2022: 3; Ythier & Lourenço, 2023: 1, 4, fig. 18.

Material examined: Egypt, South Sinai, Ain Khudra Oasis, about 25 km south-west of Nuweiba, 28°53'45"N 34°25'20"E, 684 m a.s.l., VIII.2016, 2♂♂ & 3♀♀, leg. Badry (AZMM/Sco-2016:65-69).

Description: It is a small sized scorpion. Total length 26.76 mm in male and 32.00 in female.

Colouration: Carapace: brownish black to blackish olive, shiny pitch black between the median eyes, with the anterior margin reddish brown (Figs. 5-6, 20-21). Chelicerae: Manus yellowish black; fingers dark yellow with a blackish-yellow base; teeth reddish (Figs. 5-6, 20-21). Pedipalps: trochanter and femur yellowish brown, with carinae and granules blackish brown in males; dark yellowish brown, with carinae and granules black in females. Patella brownish yellow with faint brown reticulations and brownish-yellow marbling, carinae brown in males; yellowish brown with dark brown reticulations and brownish marbling, carinae dark brown in females. Chela manus lustrous dark yellow, posterior margins light brownish yellow, condyles yellowish red. Chela fingers pale yellow, with denticles reddish brown (Figs. 7-18). Legs: trochanter yellowish brown; femur yellowish brown with brownish-yellow marbling. Posterior portion of tibia of legs I-IV yellowish brown with reticulations, anterior portion brownish yellow; pretarsus of legs I-IV dark yellow; tarsi and tarsomeres of legs I-IV pale yellow. Spinules, tips of claws, and tips of pedal spurs reddish brown (Figs. 1-4, 19). Mesosoma: tergites I-VI brownish black to blackish olive, tergite VII reddish black to blackish olive, with carinae and granulations black (Figs. 20-21). Sternites III-VI lustrous brownish yellow, posterior areas of sternites IV-V dark yellow medially; sternite VII blackish brown with black carinae and granules in males. Sternites III-V lustrous brownish yellow, sternite VI lustrous yellowish brown, and sternite VII brownish black with black carinae and

granules in females (Figs. 22-23). Metasoma: segments I-V dark reddish black with black carinae and carinal granules. Telson: vesicle reddish brown medially, reddish black laterally. Aculeus yellowish red at the base, reddish at the tip (Figs. 28-33).



Figs. 5-6. *Orthochirus negebensis* from Sinai, carapace. 5. Male. 6. Female.

Figs. 7-10. *Orthochirus negebensis* from Sinai, pedipalp. 7,10. Male. 8,9. Female. 7-8. Dorsal view. 9-10. Ventral view. Trichobothrial pattern is indicated by green circles.

Morphology

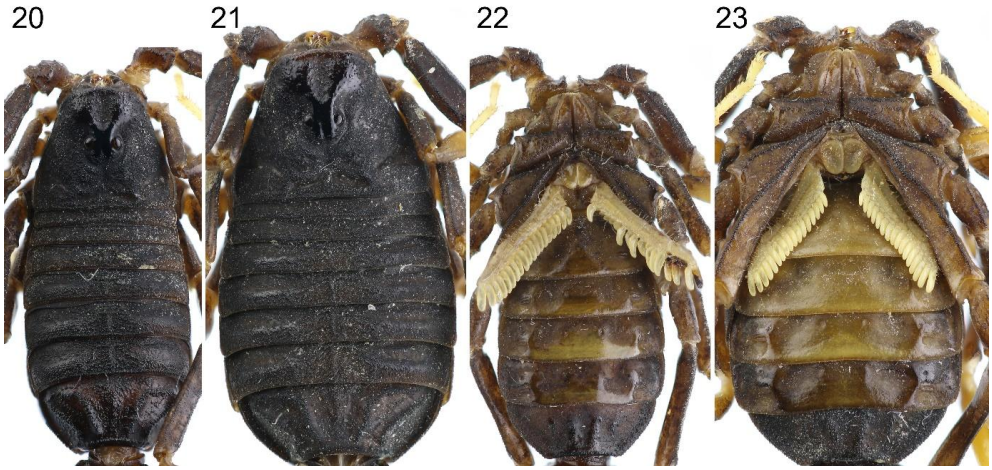
Carapace: densely granular, with minute granules; granules between anterior median carinae slightly larger and less dense. Area between median eyes smooth, with a few fine granules present in males. Interocular area smooth, but bearing flattened granules anteriorly in males; smooth and slightly rough anteriorly in females. Furrows moderate and smooth. Anterior margin of carapace convex and coarsely crenulate. Median eyes separated by almost two ocular diameters. Three pairs of lateral eyes present. Only

anterior median carinae visible, obsolete and rounded; smooth with flattened granules anteriorly in males, smooth and slightly rough anteriorly in females (Figs. 5-6, 20-21, 24-25).
Coxae with carinae densely developed and surface moderately granular. Genital operculum ovoid, divided longitudinally into two suboval and elongate sclerites, with a small posterior indentation present (Figs. 22-23, 26-27).

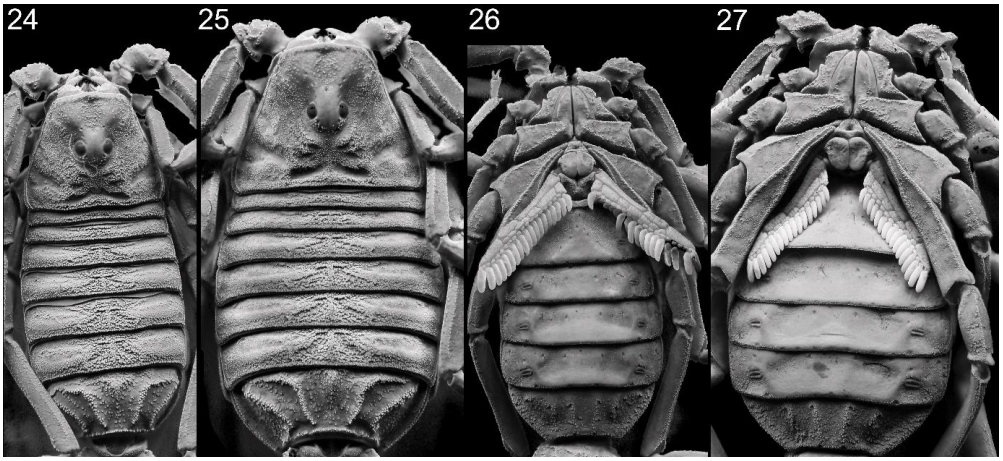
Figs. 11-18. *Orthochirus negebensis* from Sinai, pedipalp chela and chela fingers. 11-13, 17-18. Male. 14-16. Female. 11,14. Chela, ventral view. 12,15. Chela external view. 13,16. Chela, dorsal view. 17. Movable finger dentition. 18. Fixed finger dentition. Trichobothrial pattern is indicated by green circles.

Pectines: short in females, not extending to coxo-trochanteral articulation of leg IV, whereas relatively long in males, reaching well beyond articulation. Densely covered with short setae. Pectinal tooth count 19-20 in males and 16-17 in females (according to Levy & Amitai, 1980: 18-22 in males, 15-19 in females). Three marginal and six to seven median lamellae present (Figs. 22-23, 26-27).
Chelicerae: cheliceral dentition characteristic of family Buthidae (Vachon, 1963); teeth well developed and sharp (Figs. 5-6).

Figs. 19. *Orthochirus negebensis* from Sinai, right legs I-IV of male.



Figs. 20-23. *Orthochirus negebensis* from Sinai, under white light. 20-21. Carapace and mesosoma. 22-23. Sternopectinal area and mesosoma, ventral view. 20,22. Male. 21,23. Female.

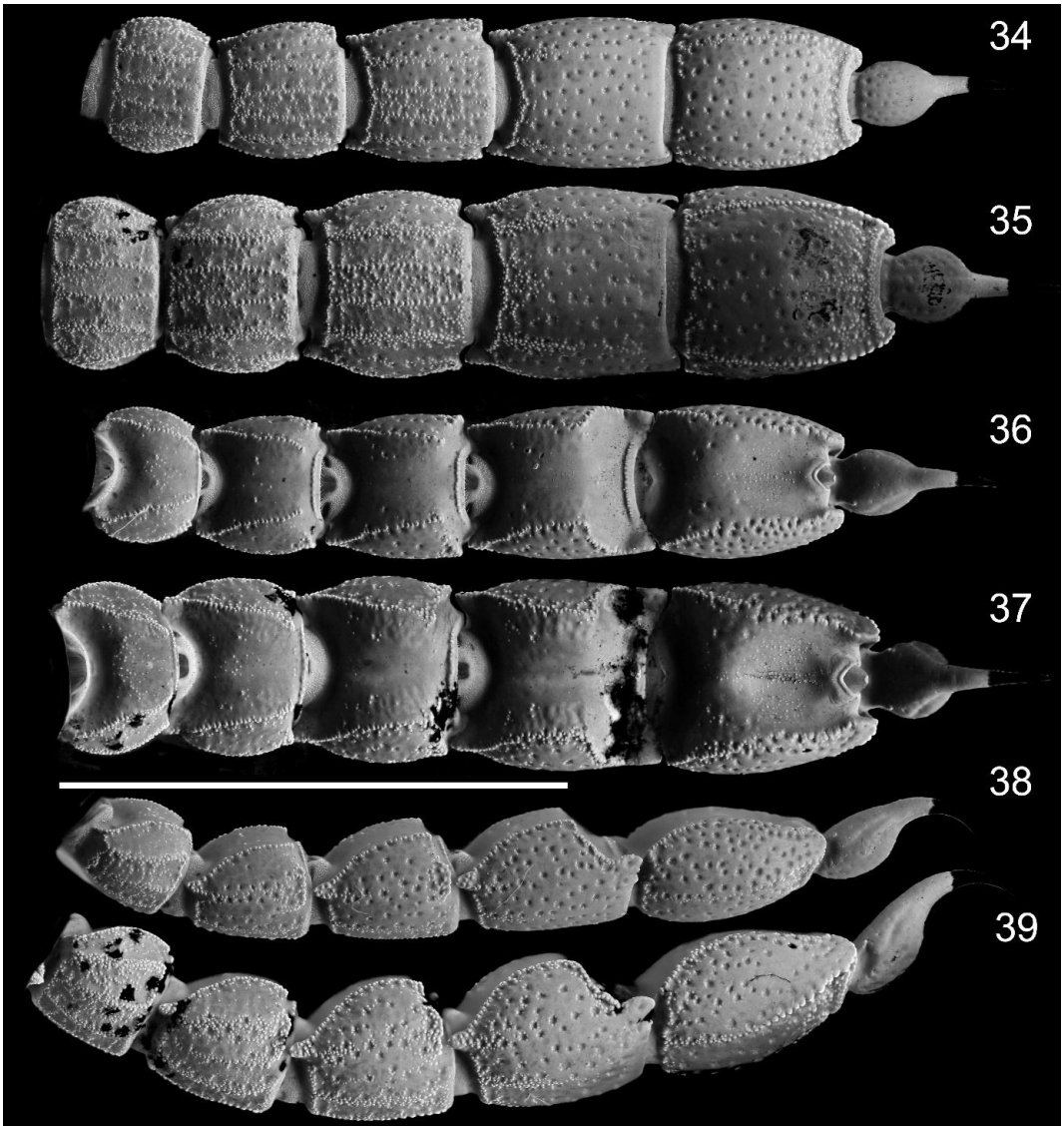


Figs. 24-27. *Orthochirus negebensis* from Sinai, under UV light. 24-25. Carapace and mesosoma. 26-27. Sternopectinal area and mesosoma, ventral view. 24,26. Male. 26,27. Female.

Pedipalp: femur slender, with five densely granular carinae composed of small granules. Dorsal intercarinal area medially granular; ventral intercarinal area granular in posterior portion. Femur about three times longer than wide (femur length/width ratio = 3.32 in male, 3.06 in female). Trichobothrium d_2 of pedipalp femur absent. Femur with a few indistinct setae and bearing a distal external macrosetal cluster. Patella with seven carinae; only dorsointernal, ventrointernal, and dorsal carinae well developed, remaining carinae smooth and obsolete. Dorsointernal and ventrointernal carinae slightly crenulate; dorsal carina granular on posterior one-fourth, remaining carinae smooth. Patella with scattered short setae. Intercarinal areas smooth. Patella about three times longer than wide (patella length/width ratio = 3.00 in male, 2.82 in female). Chela slender (chela length/width ratio = 5.82 in male, 5.44 in female; manus length/width ratio = 2.32 in male, 2.10 in female), smooth, lustrous, and without carinae. Manus narrower than patella (manus width/patella width = 0.73 in male, 0.76 in female). Movable and fixed fingers bear 7-8 rows of denticles and four distal denticles. Both internal and external accessory denticles present Chela covered with scattered, indistinct short setae (Figs. 7-18).

Figs. 28-33. *Orthochirus negebensis* from Sinai, metasoma and telson, under white light. 28,30,32. Male. 29,31,33. Female. 28-29. Ventral view. 30-31. Dorsal view. 32-33. Lateral view. (Scale bar: 10 mm).

Trichobothriotaxy: Trichobothrial pattern Type A, neobothriotaxic. Dorsal trichobothria of femur arranged in a beta configuration (Vachon, 1974, 1975). Trichobothrium *d2* absent on dorsal surface.
Legs: tarsi with two rows of slightly spinoid setae ventrally. Tibial spurs present on legs III and IV (Fig. 27). Proventral basitarsal (pedal) spur well developed, whereas retroventral basitarsal (pedal) spurs indistinct on legs I-IV. Well-developed tibial spurs also present on legs III and IV. Bristle combs present on legs I and III, consisting of 5-6 long bristles.



Figs. 34-39. *Orthochirus negebensis* from Sinai, metasoma and telson, under UV light. 34,36,38. Male. 35,37,39. Female. 34-35. Ventral view. 36-37. Dorsal view. 38-39. Lateral view. (Scale bar: 10 mm).

Mesosoma: mesosomal segments I-VI densely granular with small granules, which become denser and larger medially. Segments I-VI bear a median carina, but they are reduced in segments I-II. Segment VII bears five densely granular carinae; around median carina, surface granular, and intercarinal area smooth to moderately granular with medium-sized granules (Figs. 24-25). Sternites III-VI smooth medially with finely

granular patches and finely granular laterally. Posterior margins smooth medially but granular laterally, bearing two smooth carinae. Sternite VII bears four granular carinae. Intercarinal area granular, with denser granulation in females (Figs. 26-27).

Metasoma and Telson: segments I-III wider than long; segments IV-V longer than wide; all segments wider than deep. Widths of segments I-IV gradually increase posteriorly, while segments IV and V approximately equal in width. Segment I bears 10 granular carinae. Dorsolateral carinae strong with small granules in males, and composed of messy, small, fine granules in females. Remaining carinae moderate with messy small granules. Dorsal surfaces smooth to rough, with several minute granules medially. Lateral surfaces moderately granular in males and densely granular in females. Ventral surfaces densely granular. Lateral and ventral intercarinal areas lack punctation. Segment II bears 10 granular carinae. Dorsolateral carinae strong with small granules in males, and irregular, fine granules in females. Lateral supramedian carinae moderate, bearing small granules in males and messy, fine granules in females. Lateral inframedian carinae weak, present on anterior third and composed of several messy small granules in males, moderate and nearly complete with messy small granules in females. Ventrolateral carinae moderate, with messy fine granules in males and dense small granules in females. Ventral submedian carinae moderate with messy small granules. Dorsal surfaces smooth to rough with a few minute granules medially. Lateral surfaces smooth to rough, with a cluster of granules at posterior base of lateral supramedian carina in males, and densely granular in females. Ventral surface densely granular and rough. Lateral intercarinal area bears a few punctae on lateral supramedian carinae. Segment III bears six granular carinae. Dorsolateral carinae strong with small granules. Ventrolateral carinae moderate with messy fine granules in males, and dense small granules in females. Ventral submedian carinae moderate with small granules. Dorsal surfaces smooth to rough and lack granules in males, with a few minute granules laterally in females. Lateral surfaces smooth in males and medially granular in females. Ventral surface densely granular and rough. Lateral intercarinal area strongly punctate in males and moderately punctate in females. Segment IV bears two carinae. Dorsolateral carinae strong with small granules. Ventrolateral carinae weak and obsolete, with fine granules on anterior quarter in males and small granules on anterior half in females. Dorsal surfaces smooth to rough without granules in males, and bear a few minute granules laterally in females. Lateral surfaces smooth in males and medially granular in females. Ventral surface smooth in males, and smooth but granular on anterior third in females. Dorsal and lateral intercarinal areas strongly punctate. Segment V bears two carinae. Dorsolateral carinae strong and rounded with small granules anteriorly in males, and more densely granular in females. Ventrolateral carinae moderate, bearing fine granules anteriorly and small, rounded denticles that slightly increase posteriorly in males; in females, they bear small granules anteriorly and moderate, rounded denticles that slightly increase posteriorly. Dorsal surfaces smooth but densely granular medially. Lateral surfaces smooth without granules. Ventral surface smooth but densely granular with fine granules on posterior quarter. Dorsal and lateral intercarinal areas strongly punctate. Fifth segment markedly wider than twice width of vesicle (Figs. 28-39). Telson: vesicle elongate and smooth, with a few shallow punctae dorsally and laterally, and smooth ventrally. Aculeus shorter than vesicle and moderately curved; subaculear tubercle absent (Figs. 28-39).

Measurements: See Table (1).

Table 1. Comparative measurements of *Orthochirus negebensis* male and female from Sinai, Egypt. Abbreviations: length (L), width (W), depth (D).

Dimensions (mm)		***Orthochirus negebensis*** (from Sinai)	
		♂	♀
Carapace	L / W	3.32 / 3.74	4.00 / 5.18
Mesosoma	L	6.29	7.24
Tergite VII	L / W	1.90 / 3.98	2.54 / 5.40
Metasoma + telson	L	17.15	20.76
Segment I	L / W / D	2.10 / 2.65 / 1.97	2.55 / 3.33 / 2.53
Segment II	L / W / D	2.55 / 2.70 / 2.01	2.69 / 3.47 / 2.58
Segment III	L / W / D	2.81 / 2.84 / 2.20	3.10 / 3.60 / 2.74
Segment IV	L / W / D	3.55 / 2.97 / 2.27	4.17 / 3.76 / 2.81
Segment V	L / W / D	4.02 / 2.97 / 2.14	4.30 / 3.81 / 2.64
Telson	L / W / D	2.02 / 1.32 / 1.10	3.95 / 1.55 / 1.14
Pedipalp	L	10.45	11.92
Femur	L / W	2.73 / 0.82	3.13 / 1.02
Patella	L / W	3.18 / 1.06	3.56 / 1.26
Chela	L	4.54	5.23
Manus	L / W / D	1.81 / 0.78 / 0.84	2.02 / 0.96 / 1.04
Movable finger	L	2.92	3.46
Total	**L**	**26.76**	**32.00**

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Distribution range and morphological update of *Orthochirus soufiensis* Lourenço & Sadine, 2021 (Scorpiones: Buthidae) in Algeria

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Abstract

Orthochirus soufiensis Lourenço & Sadine, 2021 is an endemic scorpion of Algeria, recently discovered from El-Oued region (North-eastern Algeria) in desert area. This note concerns the distribution range update of this species with two new district localities; the first, over 265 km to the south, in the palm grove of Ouargla region (Eastern Algeria); and the second, more than 1000 km to the west, very close to the herbaceous *Tamarix* in Tindouf region (Southwest Algeria). These new localities may

suggest a significant extension of the distribution area of this species to the detriment of the *Orthochirus innesi*. This work aims to reconsider the distribution of all scorpions in this vast country (Algeria), as well as the proposal of a condense field work, for a better knowledge of distribution of the scorpion fauna, especially in poorly or little prospected areas.

Keywords: Distribution range, new locality, Buthidae, Scorpion, *Orthochirus,* Algeria.

Introduction

The genus *Orthochirus* was described by Karsch (1891). Simon reinstated it as a valid and distinct genus with two classical species from Egypt: *Orthochirus aristidis* (Simon, 1882) and *Orthochirus innesi* Simon, 1910 (Lourenço *et al.*, 2012). Recent revisions conducted to the description of many species from North Africa, such as: *O. atarensis* Lourenço & Leguin, 2011 from Mauritania, *O. cloudsleythompsoni* Lourenço & Leguin, 2011 from Morocco, and *O. tassili* Lourenço & Leguin, 2011 from Algeria, *O. maroccanus* Lourenço & Leguin, 2011 from Morocco (Lourenço & Leguin, 2011a; Lourenço & Leguin, 2011b), and two other species from the massifs of Chad: *O. minor* Lourenço, Duhem & Cloudsley-Thompson, 2012 and *O. tibesti* Lourenço, Duhem & Cloudsley-Thompson, 2012 (Lourenço *et al.*, 2012). Very recently, *O. soufiensis* Lourenço & Sadine, 2021 was added to the list of scorpions of Algeria. As a result, the number of *Orthochirus* species known in Algeria is raised to three.

The distribution of these species is not well documented although *O. tassili* is very limited to the Tassili massif (endemic to Algeria). The known geographic range of *O. innesi* is from Egypt to southern Tunisia (Lourenço *et al.*, 2012), its distributional area in Algeria remains uncertain and may overlap that of *O. soufiensis* (Sadine, 2020; Lourenço & Sadine, 2021). However, *O. soufiensis*, since its discovery, remains limited to its type locality in El-Oued (North-eastern Algeria) (Lourenço & Sadine, 2021).

In this study, we report the distribution range update of *O. soufiensis* in Algeria, based on two specimens recently collected from two new district localities; the first, over 265 km to the south, in the palm grove of Ouargla region (Eastern Algeria) and the second, more than 1000 km to the west, very close to the herbaceous *Tamarix* in Tindouf region (Southwest Algeria).

Material and Methods

Study area

The region of Ouargla is located in the Northern part of the Algerian Sahara, between 31°45' and 32°45'N, and between 5°20' and 5°45'E, at an average altitude of the main reliefs of 157 metres. This region is characterized by a hyper-arid climate, marked by high temperatures, low annual precipitation, and high evaporation rates (Sadine *et al.*, 2018).

The second region represents the Tindouf region which located in the Southwest of Algeria, between 27°40'-31.00"N and 8°07'-43.00"W, at an altitude of 433 metres. The climate of the region is dry and arid, with significant evapotranspiration activity (Bekkouch & Zanagui, 2018).

Sampling and identification

Scorpions sampling was conducted as part of a broader study on scorpion diversity in Algeria, involving multiple field surveys at various sites. During these surveys between June and July 2023 and near palm groves, specimens of *Orthochirus*

were collected and subsequently preserved in 70% ethanol for detailed morphological analysis.

Specimens are examined using a stereomicroscope as described by Vachon (1974). Measurements, given in mm, follow Stahnke (1970). Trichobothrial notations follow Vachon (1974) and morphological terminology mostly follows Vachon (1952).

Figs. 1-4. *Orthochirus soufiensis* Lourenço & Sadine, 2021. Habitus of male and female. 1-2. Male. 3-4. Female. 1,3. dorsal view. 2,4. ventral view. (Scale bar: 2 cm).

Results

Taxonomic treatment

Family ***Buthidae*** C.L. Koch, 1837
Genus ***Orthochirus*** Karsch, 1891
Orthochirus soufiensis Lourenço & Sadine, 2021 (Figs. 1-28)

Material examined: Algeria, Ouargla, Hassi Ben Abdellah (32º02'14"N, 05º28'39"E), 153 m a.s.1., in palm grove, 5/VI/2023 (I. Boulila), 2♂♂, 2♀♀; Tindouf, (28º00'01"N, 07º52'52"W), 419 m alt., in Sebkha, 13/VII/2023 (M. El Bouhissi), 1♂, 1♀.

Figs. 5-8**.** *Orthochirus soufiensis* Lourenço & Sadine, 2021. 5-6. Carapace and mesosoma. 7-8. Sternopectinal area and mesosoma, ventral view. 5,7. Male. 6,8. Female.

Figs. 9-12**.** *Orthochirus soufiensis* Lourenço & Sadine, 2021. 9,11. Carapace. 10,12. Sternopectinal area ventral view. 9,10. Male. 11,12. Female.

Figs. 13-22. *Orthochirus soufiensis* Lourenço & Sadine, 2021. 13-16. Pedipalp. 17-22. Chela. 13-14,19,22. dorsal view. 15-17,20. ventral view. 18,21. external view. 13,16-19. Male. 14,15,20-22. Female.

Description: It is a small sized scorpion. Total length 23.60-25.58 mm in males and 25.58-29.18 in females.

Colouration: The general colouration of the scorpion ranges from reddish-yellow to reddish-brown (Fig. 1), providing effective camouflage in its environment such as the woods of the palm tree. The **prosoma** (carapace) is predominantly brownish, with the anterior and posterior margins slightly yellowish. Both the median and lateral eyes are distinctly surrounded by black pigmentation, which enhances their visibility against the carapace. The **mesosoma** exhibits a brownish-yellow colour, with darker carinae and granulations that add texture and structural definition. The **metasomal segments** are reddish-brown, matching the telson, which features a lighter lateral stripe. The aculeus (stinger) is reddish in colour with a darker tip, while the metasomal carinae are noticeably dark brown (Figs. 23-28). The ventral surface is yellow to reddish-yellow (Figs. 2,4), and the genital operculum and pectines are pale yellow, contrasting with the surrounding structures. The pedipalps, particularly the femur and patella, appear brownish-yellow (Figs. 13-16), while the chelae are lighter yellow (Figs. 17-22) marked by reddish variegated spots, and their fingers are brownish. The legs are yellow with diffused dark brown spots scattered along their length. **Pectines:** Pectinal teeth number 18 to 20 in males and 15 to 17 in female (Figs. 10,12).

Figs. 23-28. *Orthochirus soufiensis* Lourenço & Sadine, 2021. Metasoma and telson, under white light. 23,25,27. Male. 24,26,28. Female. 23-24. ventral view. 25-26. dorsal view. 27-28. lateral view. (Scale bar: 10 mm).

Fig. 29. Habitat of *Orthochirus soufiensis* Lourenço & Sadine, 2021. A. Palm grove of Ouargla region. B. Sebkha with *Tamarix* in Tindouf region.

Morphometric observations

The morphometric comparison is conducted between male and female specimens of *O. soufiens* from Ouargla and Tindouf with the paratype measurements of Lourenço & Sadine (2021). Morphometric values are presented in Table (1).

Table 1. Comparative measurements of *O. soufiensis* from El-Oued, Ouargla and Tindouf.

Dimensions (mm)		Male from El Oued (paratype)	Male from Ouargla	Male from Tindouf	Female from Tindouf
Total length (including telson)		23.6	25.58	24.54	25.84
Carapace	Length	3	3.51	3.4	3.1
	Anterior width	2	3.16	2.8	3.3
	Posterior width	3.3	3.34	3.3	2.8
Mesosoma length		5.1	6.15	6.1	5.61
Metasomal segment I	Length	1.7	1.87	1.8	1.83
	Width	2.2	2.3	2.36	2.47
Metasomal segment II	Length	2.1	2.33	2.23	2.3
	Width	2.2	2.43	2.35	2.25
Metasomal segment III	Length	2.3	2.49	2.39	2.17
	Width	2.3	2.59	2.5	2.23
Metasomal segment IV	Length	2.8	3.43	3.38	3.07
	Width	2.3	2.83	2.44	2.39
Metasomal segment V	Length	3.5/4.8	3.67	3.5	3.7
	Width	2.4/3.7	2.88	2.5	2.5
	Depth	1.7/2.6	1.08	1.8	1.89
Telson	Length	3.1/4.1	3.47	3.2	3.4
	Width	1.1/1.7	1.3	1.21	1.4
	Depth	1/1.4	1.23	1.29	1.1
Femur	Length	2.3	2.17	2.4	2.5
	Width	0.8	0.96	0.9	1
Patella	Length	2.9	2.23	2.18	2.26
	Depth	0.9	0.9	0.88	0.93
Chela	Length	3.9	4.43	4.2	5.1
	Width	0.7	0.9	0.86	0.9
	Depth	0.8	0.8	0.9	0.8
Movable finger	Length	2.8	3	2.9	3.61

Table (1) presents a detailed comparison of the morphometric measurements of all male and female specimens of *O. soufiensis*, collected from the new localities, when the analysis reveals a remarkable morphological homogeneity among the different populations, with only minor variations primarily attributable to sexual dimorphism.

The morphometric data show a strong biological coherence among the studied populations of *O. soufiensis*. Despite minor individual variations may be related to local ecological conditions, the species maintains an overall homogeneous morphology across Eastern in palm grove (Fig. 29a.) and South-western Algeria in Sebkha biotope (Fig. 29b). This supports the idea of a solid ecological adaptation of the species to similar desert environments and confirms also its intra-specific stability within the studied range.

Discussion

In Algeria, *Orthochirus* is represented by three confirmed species (Dupré *et al.*, 2023*).* The first species is *O. innesi* was first mentioned by Vachon (1952) in the Saharan region of Beni Abbès, in Souf (East Algerian) (Sadine *et al.*, 2011), in Northern Algerian Sahara (Sadine, 2012, 2018). More recently, Sadine (2020) reported the presence of *O. innesi* in Zelfana, a locality situated outside its previously known geographic range. The second species is *O. tasseli* is located very far from the *O. innesi* in the Tassili massif in the extreme south-east of Algeria (Lourenço & Leguin, 2011a). The third is *O. soufiensis* is very recently added to the list of Algerian scorpions (Lourenço & Sadine, 2021) mainly located in cohabitation with *O. innesi*.

Morphometric analyses showed a clear divergence between the cohabiting populations of *Orthochirus* of Ouargla (*O. innesi* and *O. soufiensis*), such as in body size and sexual dimorphism. Total body length ranges from 23.6 mm in the male paratype from El Oued to 35.1 mm in the female holotype from the same locality. Other specimens, notably those from Ouargla and Tindouf, exhibit lengths ranging from 24.5 to 25.8 mm, suggesting inter-regional morphological consistency. The notably larger size of the female holotype illustrates marked sexual dimorphism, also reflected in the length of the mesosoma.

The dimensions of the carapace and mesosoma are relatively stable across individuals. The mesosoma reaches a maximum length of 9.3 mm in the female holotype, while remaining between 5.5 and 6.1 mm in the other specimens, confirming a more pronounced abdominal expansion in females.

Metasomal segments (I-V) follow a logical progressive increase in size, without significant variation between localities. Specimens from Tindouf and Ouargla show values very close to those of the paratype, suggesting similar morphological adaptation to arid conditions. The telson also shows little variation, with lengths ranging from 2.7 to 4.1 mm and a relatively consistent depth (1.0 to 1.4 mm), indicating structural conservation of this segment regardless of region.

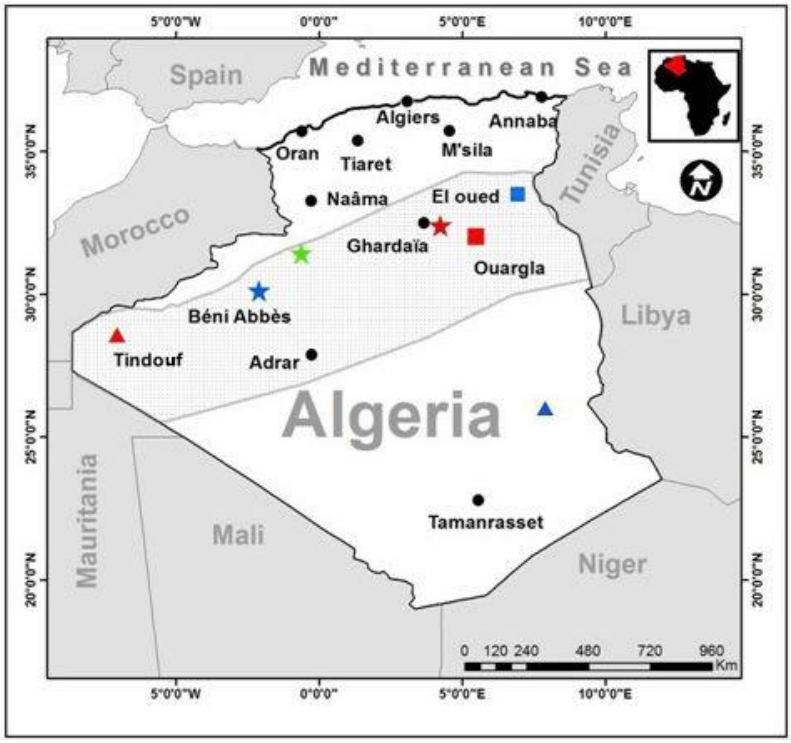

Fig. 30. Map of Algeria showing the distribution of *Orthochirus soufiensis* and *O. innesi.* The original locality of *O. soufiensis* is marked with a blue square (El Oued), with recent records shown by red square (Ouargla) and a red triangle (Tindouf). The distribution of *O. innesi* is indicated by a red star (El Oued) and a blue star (Béni Abbès), with a new observation from El Bouhissi (2023) marked by a green star, and a *O. tassili* represented by a blue triangle.

Regarding locomotor appendages, the lengths and widths of the femur and patella vary only slightly among specimens. This points to morpho-functional stability that allows for similar adaptation to desert substrates across regions. Finally, the chelae

(pincers) and movable fingers are slightly larger in females, particularly in the Tindouf specimen, with a chela length of up to 5.1 mm and a movable finger length of 3.61 mm. These differences may reflect slight plasticity linked to behavioural functions such as prey capture or defence.

Although slight differences in size are observed, these variations are most likely attributable to factors such as age (e.g. the specimens being fully mature individuals) or favourable environmental conditions in the newly sampled localities, Nevertheless, the consistency in key morphological traits such as the trichobothrial pattern, the number of pectinal teeth (18 to 20 in males and 15 to 17 in females), and the presence of 7-8 rows of granules on the movable fingers of the pedipalps strongly supports the identification of all specimens as belonging to the same species.

Sadine (2018) reported the presence of *O. innesi* in Zelfana, a locality situated outside its previously known geographic range, characterized by the coexistence of date palms, *Phoenix dactylifera,* and *Tamarix* spp.

This observation suggests that the species may extend its range toward the central Algerian Sahara, provided that ecological conditions particularly the presence of structured vegetation are met.

O. soufiensis in two new localities also is located outside its distribution area as previously defined by Lourenço & Sadine (2021): a palm grove in Ouargla and a *Tamarix* dominated area in the Tindouf region.

These new findings show that *O. soufiensis*, like *O. innesi*, has a broader distribution in Algeria than previously thought (Fig. 30).

The species appears to favour vegetated habitats, especially oasis ecosystems, tamarisk stands, and certain semi-arid biotopes, which are consistent with the ecological conditions observed for *O. innesi* in Zelfana.

However, a major difference lies in the typical habitats occupied by *O. innesi*, which shows greater tolerance to open and xeric environments. This was confirmed by the observations of one of the authors, El Bouhissi (2023), during fieldwork in particularly arid zones of the Béchar region: one specimen was found in a Hmada (a rocky, sparsely vegetated area), and another in an Erg (a typical Saharan environment consisting of sand dunes and very sparse vegetation).

Thus, although both species share the ability to expand their range and colonize habitats beyond their known distributions, *O. soufiensis* appears to rely more on microclimatic conditions created by vegetation, whereas *O. innesi* more readily adapts to mineral, dry, and open environments characteristic of extreme desert landscapes.

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First record of *Lissothus occidentalis* Vachon, 1950 from Algeria (Scorpiones: Buthidae)

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Abstract

This note concerns a new record of *Lissothus occidentalis* Vachon, 1950 in Tindouf region of western Algeria. This discovery represents a significant eastward extension of the known distribution range of this species. Furthermore, it highlights the importance of the biological richness of the southern Saharan zones which is still poorly documented in terms of scorpions. The number of confirmed species of *Lissothus* in Algeria is raised to three.

Keywords: Scorpions, *Lissothus occidentalis*, distribution, Tindouf, Algeria.

Introduction

The genus *Lissothus* Vachon, 1948 is among the rarest and most enigmatic scorpions in North Africa. It was first established with *L. bernardi* Vachon, 1948 from

Libya, followed by *L. occidentalis* Vachon, 1950 from Mauritania (Vachon, 1948, 1950, 1951), and later *L. chaambi* Lourenço & Sadine, 2014 from Algeria, in the Ghardaïa region, and more recently by *L. guezzamensis* Yağmur, Benali & Derradj, 2025 from Algeria too (Lourenço & Sadine, 2014; Yağmur *et al.*, 2025). This genus has been mentioned in a few general taxonomic compilations only (Fet *et al.*, 2000; Lourenço, 2001). Similarly, *L. bernardi*, since its description, has never been rediscovered. In the region of Tassili N'Ajjer (southern Algeria) and not far from the type locality of *L. bernardi*, Lourenço described another genus very close to *Lissothus*, named *Pseudolissothus* Lourenço, 2001 with a single species *P. pusillus* (Lourenço, 2001).

At present, only four species of *Lissothus* are recognised, their occurrence is confined to isolated saharan habitats, which accounts for the scarcity of records (Lourenço, 2001; Lourenço & Sadine, 2014; Stockmann *et al.*, 2016). After *L. occidentalis* was reported in Morocco (Stockmann *et al.*, 2016), our note now provides the first record of this species in Algeria, demonstrating an eastward extension of its known range.

Material and Methods

Study area

The region of Tafagoumt (Tindouf) is located in the south-western part of Algeria, characterised by a hyper-arid Saharan climate with prolonged drought, minimal rainfall (9 mm in February and 15 mm in October), and pronounced thermal extremes (45.8°C in July and 2.4°C in January) (Chevalier, 1943; Kechairi, 2009). Our specimen was collected in a stony hamada environment (Fig. 1) at an average altitude of 394 m.

Fig. 1. Stony hamada, habitat of *Lissothus occidentalis* Vachon, 1950 in Tafagoumt region (South-western Algeria).

Material examined and identification

During a field survey on 5 March, 2025, in the Tafagoumt region, Tindouf (28°43'18"N, 8°25'42"W). A specimen (1♀; Fig. 2) was found under a small stone in stony hamada environment. The material has been deposited in the Laboratory of Zoology, University of Ghardaïa, Algeria.

Fig. 2. *Lissothus occidentalis* Vachon, 1950 (♀) alive in natural stony Hamada environment at the Tafagoumt region, Tindouf (South-western Algeria).

Identification and confirmation of the genus and species based on morphological characters follow Vachon (1952a) and trichobothrial notations follow Vachon (1974).

Fig. 3. *Lissothus occidentalis* Vachon, 1950 ♀, habitus, dorsal and ventral views.

Results and Discussion

Family **Buthidae** C.L. Koch, 1837
Genus ***Lissothus*** Vachon, 1948
Lissothus occidentalis Vachon, 1950 (Figs. 2-6)

Diagnosis

The examined specimen was small and yellowish in colour, its attribution to the genus *Lissothus* was very easy. This is the first record of the species *L. occidentalis* in Algeria, that was previously known only from Mauritania and more recently from Morocco (Stockmann *et al.*, 2016). This species has a total length 28.88 mm; colouration from yellow to light brown with darker parts on metasomal segments IV and V (Fig. 3). Trichobothriotaxy of type A (Vachon, 1952b; Stockmann *et al.*, 2016).

The interocular region of the carapace; carapace trapezoidal, finely granulated, without carinae (Fig. 4); sternum subtriangular (Fig. 5); pectines with fulcra (15-18 teeth in males, 14-16 in females); telson without subaculear tubercle, with a short aculeus (Fig. 6).

4

5

6

Figs. 4-6. *Lissothus occidentalis* Vachon, 1950 from Tafagoumt region, Tindouf (South-western Algeria). 4. Carapace. 5. Sternum. 6. Metasomal segments IV–V and telson.

The recent discovery of a third confirmed species in Algeria extends the known range of the genus *Lissothus* eastwards and highlights the crucial biogeographical role of Saharan transition zones as reservoirs of diversity both *Lissothus* and *Pseudolissothus* are largely endemic to North Africa, with restricted and often disjointed distributions, which underscores the conservation significance of these habitats. The three *Lissothus* species

display patchy distributions in geographically distant areas, while *Pseudolissothus pusillus* appears to be endemic to the mountainous zones of Tassili N'Ajjer in Algeria, known only from its type locality.

This new record brings the number of *Lissothus* species currently documented in Algeria to three and emphasises the importance of the south-western Saharan regions, located at the interface between Morocco, Mauritania, and Western Sahara, as potential refugia for relict populations. Furthermore, the recent identification of *Buthacus sadinei* Ythier, 2022 from the Tindouf region confirms the major significance of this largely unexplored Saharan transition zone for understanding scorpion biodiversity. Taken together, these observations underline the urgent need to strengthen faunal inventories in these arid and fragile environments and, based on these findings, we suggest intensifying efforts to survey the Sahara and conduct further research on the genus *Pseudolissothus*, which remains poorly known in Algeria.

Therefore, the current distribution of *Lissothus* species can be summarized in Fig. (7).

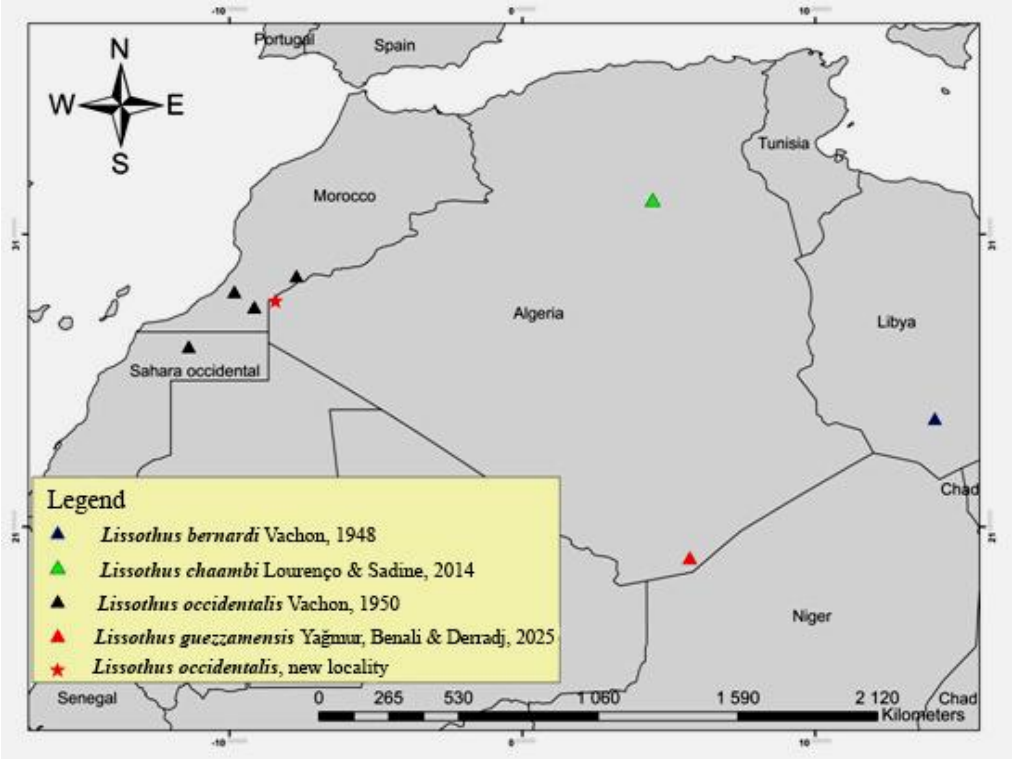

Fig. 7. Distribution map of the known *Lissothus* species, showing the extended distribution of these species in Algeria.

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Predation on the gecko *Tarentola mauritanica* (Linnaeus, 1758) (Squamata: Phyllodactylidae) by the scorpion *Aegaeobuthus gibbosus* (Brullé, 1832) (Scorpiones: Buthidae) in western Peloponnese, Greece

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Abstract

We report a natural case of predation on the gecko *Tarentola mauritanica* (Linnaeus, 1758) by *Aegaeobuthus gibbosus* (Brullé, 1832) in Western Peloponnese, Greece. The event was recorded during a nocturnal survey in a sandy habitat. The scorpion was observed grasping the gecko with its pedipalps and feeding on it. This observation provides new insights into the trophic interactions of *A. gibbosus*.

Keywords: *Tarentola mauritanica*, *Aegaeobuthus gibbosus*, gecko, nocturnal, Greece.

Introduction

Aegaeobuthus gibbosus (Brullé, 1832) was originally described under the name *Buthus gibbosus*, based on specimens collected in Greece during the French scientific expedition to Morea. This represents one of the earliest formally recorded scorpion species in the Mediterranean region. Later, Vachon (1952), in his classical revision of the family *Buthidae*, transferred the species to the genus *Mesobuthus* due to morphological affinities with other Eurasian taxa, particularly in the metasoma and pedipalps. The species remained within *Mesobuthus* for several decades, although its position was repeatedly debated because of both morphological inconsistencies and biogeographic peculiarities (Fet *et al.*, 2000; Lourenço, 2020).

In a comprehensive revision of *M. gibbosus* and related taxa, Kovařík (2019) reassessed the diagnostic characters of the group and demonstrated that *M. gibbosus* represents a distinct evolutionary lineage. Based on detailed morphological features such as the arrangement of trichobothria, the development of metasomal carinae, the granulation and shape of the telson, and distributional patterns restricted to the Aegean region, he proposed the establishment of a new genus, *Aegaeobuthus* Kovařík (2019). Consequently, *Buthus gibbosus* was designated as the type species of this new genus and is currently recognized as *Aegaeobuthus gibbosus*. Today, *A. gibbosus* is considered an endemic element of the Eastern Mediterranean fauna, mainly distributed in western Peloponnese, Greece, including the Peloponnese, the Ionian and Aegean islands, and parts of western Türkiye (Kovařík, 2019; Kaltsas *et al.*, 2008). Despite this relatively wide distribution, available information on its ecology and life history remains limited. Most studies have focused on its taxonomy and geographic distribution, while knowledge about its feeding ecology, reproductive biology, and behavioural adaptations is still fragmentary (Polis, 1990; Kaltsas *et al.*, 2008). In this context, we provide the first documented case of gecko predation by *A. gibbosus* in the Peloponnese region, contributing new insights into the trophic ecology of this species and enriching the limited knowledge on vertebrate predation among Mediterranean scorpions.

Material and Methods

The observation was made on September 6th 2025 at 22h30, air temperature around 26°C, during a field survey in Vartholomio beach in the region of Eli, western part of the Peloponnese, Greece, (37°48'43.8"N, 21°13'21.0"E). The habitat consists of sandy soil with scattered vegetation and organic debris as well as beach litter.

Results and Discussion

A. gibbosus scorpion was observed under a piece of cardboard surrounded by sand and at more than 15 m from the forest border (Fig. 1). The scorpion had consumed most parts of the juvenile gecko's body, except its head and forelimbs, which were later discarded after the scorpion was exposed to white light without any direct contact. Under the same cardboard, second adult *A. gibbosus* was found together with a juvenile *T. mauritanica*, reflecting a situation of spatial proximity between predators and their prey. We note that this gecko species is predominantly arboreal and only occasionally seen moving on the ground. It is hence unclear how the two *T. mauritanica* geckos reached this isolated piece of cardboard the latter might have been first located closer to trees and then brought further to the beach under human intervention.

The gecko could be identified as *Tarentola mauritanica* (Linnaeus, 1758) (Squamata: Gekkota: Phyllodactylidae). This gecko species has been widely introduced into Greece, in particular in the Peloponnese, where it is rapidly spreading (Katsiyiannis & Tzoras, 2025).

The coexistence of scorpions and geckos under artificial shelters such as cardboard pieces and scattered debris in the sand dunes of Vartholomio beach indicates that these non-natural structures provide alternative microhabitats for both the scorpion and its prey. This type of communal shelter creates a high-density environment for organisms, where the probability of direct interactions between species, including predation, is increased.

Although similar observations were not recorded in the Strofylia National Park further north, the abundance of *A. gibbosus* in this reptile-rich area (inhabited also by the

European snake-eyed skink *Ablepharus kitaibelii*) makes the authors think that such a predation should not be isolated even, indeed, both skinks and gecko were observed at the foot of trees, where many *A. gibbosus* occur and forage at night. Scorpions are generally regarded as opportunistic predators feeding primarily on arthropods, though occasional predation on small vertebrates has been reported (McCormick & Polis, 1990; Polis, 1990). However, such events are rarely documented in the wild, and cases involving lizard predation are particularly scarce (Kaltsas *et al.*, 2008). In North Africa, a remarkable case was documented by Sadine & El Bouhissi (2021), who observed *Androctonus amoreuxi* preying upon *Acanthodactylus*, while other reports have noted lacertid predation by scorpions involving *Podarcis hispanicus* lizard and *Psammophis* snake species. In Morocco, *Buthus lienhardi* was observed feeding on the skink *Chalcides montanus*, and another case involved *Buthus* preying on *Tropiocolotes algericus* gecko (Mousaid & Bouazza, 2025). Lastly in Greece, Bringsøe *et al.* (2022) reported the first case of predation on a hatchling chameleon *Chamaeleo africanus* (≈65 mm) by *Aegaeobuthus gibbosus* (≈60 mm) at Gialova Lagoon, located 100 km south from the Vartholomio beach in the Peloponnese region. In this case, the scorpion was found carrying the dead hatchling near freshly hatched nests, indicating direct predation. Predatory interactions between scorpions and other arachnids have also been reported, where body size asymmetry appears to play a decisive role. For example, a case from Lebanon described the tarantula *Chaetopelma olivaceum* preying upon a subadult *Aegaeobuthus nigrocinctus*, immobilizing the scorpion before dragging it into its burrow without signs of envenomation (Khashab, 2025).

Fig. 1. A female *Aegaeobuthus gibbosus* scorpion consuming a *Tarentola mauritanica* gecko leaving only the head and forelimbs, in Greece.

From an ecological perspective, our observations highlights three key aspects: first, the behavioural flexibility of the scorpion, as it exploits new resources such as waste as shelters that increase hunting opportunities; second, the indirect impact of human

activity, since waste contributes to altering predation patterns and interspecific coexistence; and third, the importance of this phenomenon for community dynamics, as increased predation rates on geckos or other small reptiles may affect the composition and balance of local assemblages.

Accordingly, documenting such field observations does not merely represent a casual behavioural record but provides ecological evidence of how species interact with changes in their habitats, whether natural or human-induced.

Acknowledgment

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First record and description of the male of *Oxyopes kusumae* Gajbe, 1999 (Araneae: Oxyopidae)

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Abstract

Family Oxyopidae is notably diverse, containing 447 species worldwide, with 90 species documented from India through various studies. During a faunal survey conducted in Tal Chhapar Wildlife Sanctuary, *Oxyopes kusumae* was first time encountered from Rajasthan. Although the female of this species has been described previously, the male has remained undescribed in the scientific literature. This paper provides the first description of the male *O. kusumae* along with a detailed morphological redescription of the female. The present study contributes to the taxonomy of the genus by enhancing diagnostic clarity and facilitating more accurate identification in future arachnological research.

Keywords: Araneae, Oxyopidae, *Oxyopes*, *kusumae*, Rajasthan, Tal Chhapar Wildlife Sanctuary, India.

Introduction

Family Oxyopidae, commonly known as lynx spider, comprises 447 species of 9 genera worldwide, of which 90 species belonging to four genera viz., *Hamadruas* Deeleman-Reinhold, 2009, *Hamataliwa* Keyserling, 1887, *Oxyopes* Latreille, 1804, and *Peucetia* Thorell, 1869 have been recorded from India (World Spider Catalog, 2025; Caleb & Sankaran, 2025). Genus *Oxyopes* is a diversified group with 284 species globally, 56 of which have been documented from India over the years (Strand, 1912; Tikader, 1969, 1970; Biswas & Majumder, 1995; Biswas *et al.*, 1996; Gajbe, 1999, 2008; Biswas & Roy, 2005; Bodkhe & Vankhede, 2012; Dhali *et al.*, 2015; Sen *et al.*, 2015;

Malik *et al*., 2016; Goyal & Malik, 2020; Sen & Sureshan, 2021; Sarkar *et al*., 2021; Amulya *et al.*, 2022; Sankaran, 2024). During the present study, *Oxyopes kusumae* was recorded for the first time from Tal Chhapar Wildlife Sanctuary, Rajasthan.

Till now, only the female of *O. kusumae* was originally described from Madhya Pradesh by Gajbe (1999), but the male has remained undescribed in the scientific literature. Therefore, the present study provides the first description of male *O. kusumae*, accompanied by a detailed morphological redescription of the female. This comprehensive taxonomic account aims to improve species-level identification and contribute to a better understanding of intraspecific variation within the genus *Oxyopes*.

Material and Methods

The specimens were collected from Tal Chhapar Wildlife Sanctuary, located in Churu district of Rajasthan, India, at the geographical coordinates 27.798141°N, 74.434937°E. The collection was carried out by using the sweeping method from grasses. After collecting, the specimens were preserved in 70% ethanol to maintain its morphological integrity for further examination. The preserved samples were catalogued and deposited under Lab No. 16 in the Department of Zoology at the University of Rajasthan, Jaipur. Detailed morphological observations and documentation were conducted using a Cilika digital zoom microscope, and photographic records were captured using the integrated Cilika software. For taxonomic study, the male genitalia was carefully dissected and diagnostic structures were photographed.

Abbreviations used in text and tables are: ALE = anterior lateral eye; ALE-ALE = distance between anterior lateral eyes; ALE-PLE = distance between anterior lateral eye and posterior lateral eye; AME = anterior median eye; AME-ALE = distance between anterior median eye and anterior lateral eye; AME-AME = distance between anterior median eyes; d = dorsal; pl = prolateral; PLE = posterior lateral eye; PLE-PLE = distance between posterior lateral eyes; PME = posterior median eye; PME-PLE = distance between posterior median eye and posterior lateral eye; PME-PME = distance between posterior median eyes; rl = retrolateral; v = ventral.

All measurements are in millimetres.

Results

Oxyopes kusumae Gajbe, 1999

Material Examined: 4♂♂ and 5♀♀ collected from Tal Chhapar Wildlife Sanctuary, Churu, Rajasthan, India; collected by Nirmala Kumari.

Description of male: Total length 6.95. Cephalothorax: length 3.13, longer than wide, light orange in colour, carapace high and convex, centre of thoracic region with fine fovea, and lateral position with fine hairs. Ocular region has pearl white jelly like mat, anterior row of eyes are strongly recurved, anterior median eyes are smallest in all, anterior lateral eyes are largest in all, posterior row of eyes are strongly procurved, eyes equal in size and nearly equidistant, ALE, PLE and PME eyes form hexagon, all of them with black rim. Eye diameters: AME 0.12, ALE 0.19, PME 0.18, PLE 0.18, distance between eye to eye : AME-AME 0.12, ALE-ALE 0.19, AME-ALE 0.05, PME-PME 0.25, PLE-PLE 0.92, ALE-PLE 0.19, PME-PLE 0.26. A pair of fine long hair arose from the rim base of ALE and some fine hair also covered ocular region. Clypeus yellowish orange with 0.34 mm high and two clypeal lines from anterior median eye to the middle part of chelicerae. Chelicerae vertically positioned, hairy, of orange colour, a pair of spines present at anterior part of chelicerae, at the base of chelicerae with yellowish

brown small fangs. Heart shaped sternum, posteriorly pointed, longer than wide; maxillae and labium promarginally with scopulae. Leg formula 1243. Leg measurements are given in table (1). Leg with three tarsal claws, pale yellow to yellowish colour, strong and long, covered with evident spines and hair. Spination pattern of legs in table (2).
Abdomen: length 3.72, longer than wide, posteriorly narrow, predominantly pale yellow with a darker yellow to orange central longitudinal band running dorsally, flanked by diffuse brownish lateral marking. The pattern is symmetrical and extends from the anterior part to posterior end of the abdomen. Ventrally pale yellow coloured, a longitudinal dark brown to black central band extending from epigastric furrow to the base of spinnerets. Spinnerets are six in number, dark brown in colour, ecribellate, without colulus. Pedipalp: palpal organ as in figure1(C-D).

Table 1. Measurements of the legs of male *Oxyopes kusumae*.

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	3.45	1.08	4.03	5.26	1.79	15.61
II	3.39	1.10	3.22	3.99	1.40	13.10
III	3.11	1.06	2.63	3.10	1.20	11.10
IV	3.29	1.03	2.94	4.18	1.26	12.70

Table 2. Spination pattern of legs of male *Oxyopes kusumae*.

Leg	Femur	Patella	Tibia	Metatarsus
I	d1, pl3, rl3	d2, rl1	d2, pl3, rl2, v2	d1, pl6, rl6
II	d3, pl2, rl3	d1, rl1	d2, pl3, rl3	pl6, rl6
III	d3, pl2, rl3	d2, rl1	d2, pl3, rl4	pl6, rl6
IV	d3, pl2, rl2	d2, rl1	d1, pl4, rl4	pl6, rl6

Description of female: Total length 10.08. Cephalothorax length 3.43. Abdomen length 6.65. Cephalothorax, clypeus, chelicerae, fangs, sternum, maxillae, labium, eye pattern and abdomen are similar to male but the colour of abdomen is slightly different. Eye diameters: AME 0.12, ALE 0.20, PME 0.19, PLE 0.19, and inter distances: AME-AME 0.18, ALE-ALE 0.24, AME-ALE 0.12, PME-PME 0.30, PLE-PLE 1.08, PME-PLE 0.3. Leg formula: 1243. Leg measurements are given in table (3). Spination pattern of legs in table (4). Epigyne as in figure 1(F).

Table 3. Measurements of the legs of female *Oxyopes kusumae*.

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	4.02	1.27	3.99	3.90	1.50	14.68
II	3.78	1.21	3.60	3.86	1.40	13.85
III	3.33	1.13	2.58	3.29	1.14	11.47
IV	3.92	1.02	3.24	4.33	1.28	13.79

Table 4. Spination pattern of legs of female *Oxyopes kusumae*.

Leg	Femur	Patella	Tibia	Metatarsus
I	d3, pl3, rl2	d2, rl1,	d2, rl3, pl3	pl6, rl6
II	d3, pl2, rl3	d2, rl1	d2, pl3, rl3	pl6, rl6, v1
III	d3, pl3, rl3	d1, pl1, rl1	d2, pl3, rl3	pl6, rl6, v1
IV	d3, pl2, rl1	d1, pl1, rl1	d2, pl4, rl3	pl6, rl6, v1

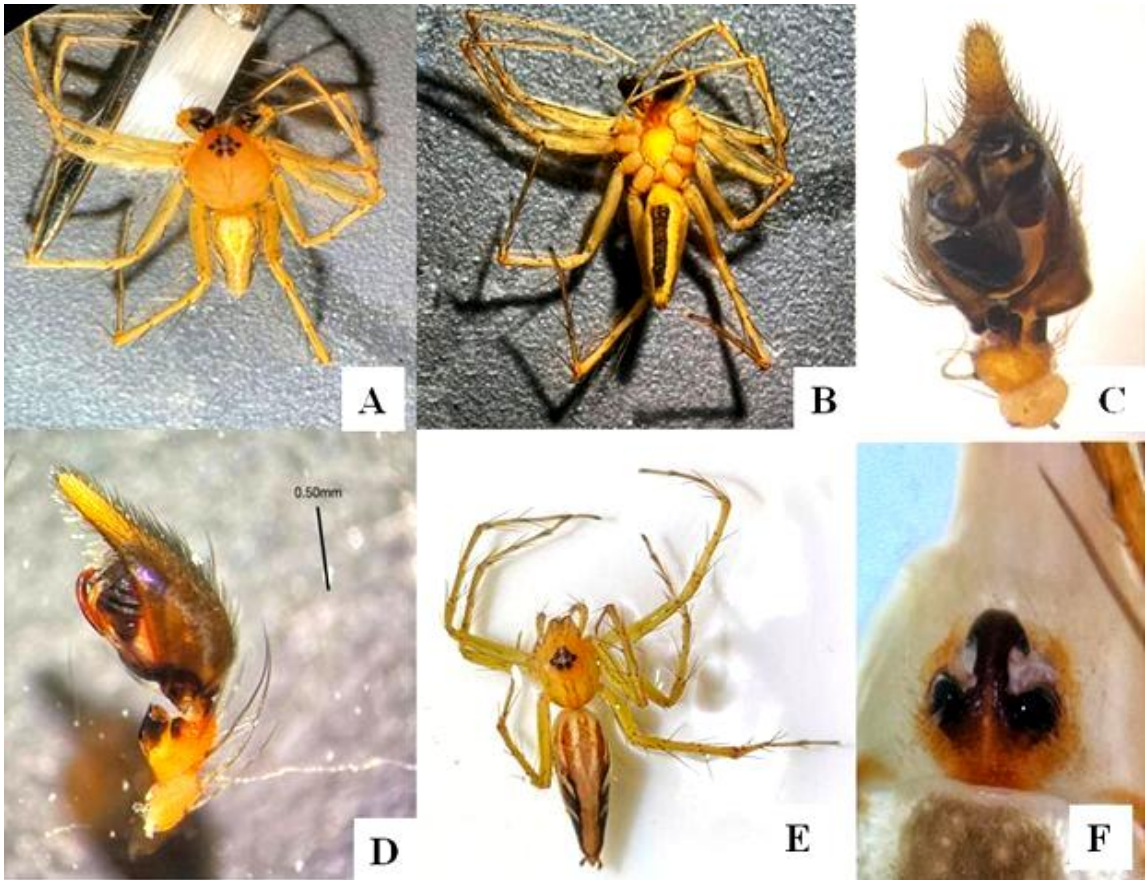

Fig. 1. *Oxyopes kusumae* Gajbe, 1999 A-D. Male. A-B. Habitus. A. dorsal view. B. ventral view. C-D. Pedipalp, palpal organ. C. ventral view. D. retrolateral view. E-F. Female. E. Habitus, dorsal view. F. Epigyne, ventral view.

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The distribution of *Argiope lobata* (Pallas, 1772) and *A. trifasciata* (Forskål, 1775) in Italy with new records (Araneae: Araneidae)

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Abstract

New records for *Argiope lobata* (Pallas, 1772) and *A. trifasciata* (Forskål, 1775) in Italy are given. First occurrences of *A. lobata* from Piedmont, Friuli-Venezia Giulia, Liguria, Abruzzo and Molise and *A. trifasciata* from Campania and Apulia are quoted. In addition, many records for new provinces are cited for both species, improving considerably the knowledge of the distribution of these two spider species in Italy.

Keywords: Orb-weaver spiders, *Argiope*, faunistics, first records, Italy.

Introduction

The genus *Argiope* Savigny, 1825 includes 86 species occurring on all continents except Antarctica, mainly in the tropical and subtropical zones (World Spider Catalog, 2025). Three species are known in Europe (Nentwig *et al.*, 2025), all of which also occur on Italian territory (Pantini & Isaia, 2019). Only the most common of these species, *A. bruennichi* (Scopoli, 1772), is known in all Italian regions (Pantini & Isaia, 2019), whilst the other two species are less widespread in Italy.

Argiope lobata (Pallas, 1772) has a wide distribution from Southern Europe to China and from northern to sub-Saharan Africa (World Spider Catalog, 2025). This spider is currently known in 12 Italian regions (Pantini & Isaia, 2019), but only in Sicily and Sardinia there is quite satisfactory (although surely not completed) information about its real distribution (see Pavesi, 1876, 1878; Cantoni, 1881; Costa, 1884; Failla Tedaldi, 1887; Boeris, 1889; Garneri, 1902; Roewer, 1960; Brignoli, 1968, 1979; Hansen, 1991; Pesarini, 1995; Pantini *et al.*, 2013; Nicolosi *et al.*, 2024).

Argiope trifasciata (Forskål, 1775) is a species originally from America, but now introduced in several parts of the world (World Spider Catalog, 2025). Its first occurrence in Europe (probably as introduced species) dates back to 1977 in south-eastern Spanish mainland (Morano & Ferrández, 1985) and nowadays it is known as well as in mainland Spain also in Portugal, Balearic Islands (Cardoso & Morano, 2010), Malta and Italy (Di Pompeo *et al.*, 2011). In the latter country the species was recorded for the first time in 2009 and 2010 in some localities of Sicily and Sardinia (Di Pompeo *et al.*, 2011); currently, in addition to other Sicilian localities (Dentici & Galasso, 2021), including Lampedusa island (Nicolosi *et al.*, 2024), the species is known also from Calabria (Bonelli, 2018).

This paper provides new records for these two species in Italy updating their known distribution in the country.

Material and Methods

The material examined consist of photographed specimens from websites (see abbreviations below).

All listed records were confirmed by the author. Both *A. lobata* and *A. trifasciata* can be recognised from photographs due to specific morphological or chromatic characters: *A. lobata* has distinctive abdominal lobes, whilst *A. trifasciata*, although quite similar to *A. bruennichi*, is easily noticeable through different abdominal markings and the number and intensity of leg bandings.

For each site, the following information is given (when available): locality, coordinates, date of collecting, number of specimens, photographer, source. Geographical coordinates are in decimal degrees (datum WGS84). The uncertainty (in meters) of data is indicated according to the point-radius method (Wieczorek *et al.*, 2004).

Abbreviations used under material examined are the following:

FEI = Forum Entomologi Italiani (http://www.entomologiitaliani.net/)

IN = iNaturalist (https://www.inaturalist.org/)

OB = Observations.org (https://observation.org/)

Fig. 1. Specimen of *Argiope lobata* from island of Pianosa, Tuscany (photo by Filippo Ceccolini).

Material examined

Argiope lobata (Pallas, 1772)

Piedmont: Asti, Nizza Monferrato, 44.7909°N 8.3403°E (un. not recorded), 7.VII.2023, 1 specimen, photo by "TGH_86" (OB) (https://observation.org/observation/279422033/). **Friuli-Venezia Giulia:** Pordenone, San Quirino, near San Foca, 46.06181°N 12.73052°E (un. = 122 m), 16.VII.2021, 1 specimen, photo by Marco Vicariotto (IN) (https://www.inaturalist.org/observations/87767076); *idem*, 46.04034°N 12.74796°E (un. = 387 m), 24.IX.2023, 1 specimen, photo by "twity11" (IN) (https://www.inaturalist.org/observations/215073282). **Liguria:** Savona, Finale Ligure, Varigotti, 44.18557°N 8.40741°E (un. = 61 m), 29.VIII.2019, 1 specimen, photo by "damighez" (IN) (https://www.inaturalist.org/observations/31755468). **Emilia-Romagna:** Reggio Emilia, Castelnovo ne' Monti, Maro, 44.40704°N 10.44062°E (un. = 3 m), 25.VIII.2018, 1 specimen, photo by Fabrizio Lanfredi (IN) (https://www.inaturalist.org/observations/15909714). **Tuscany:** Lucca,Viareggio, Torre del Lago, 43.83150°N 10.30248°E (un. = 50 m), 15.IX.2019, 1 specimen, photo by "theollewellyn" (IN) (https://www.inaturalist.org/observations/32728493); Pisa, Vecchiano, 43.80735°N 10.26142°E (un. not recorded), 16.VI.2025, 1 specimen, photo by Andreas Rimoldi (IN) (https://www.inaturalist.org/observations/290071741; Livorno: Campiglia Marittima, near Rocca di San Silvestro, 43.08798°N 10.60805°E (un. = 15 m), 30.VII.2023, 1 specimen, photo by Samuele Papeschi (IN) (https://www.inaturalist.org/observations/175809084); *idem*, 43.08585°N 10.60258°E (un. = 2 m), 28.VII.2023, 1 specimen, photo by Samuele Papeschi (IN) (https://www.inaturalist.org/observations/175443498); *idem*, 43.08266°N 10.60559°E (un. = 4 m), 17.VIII.2024, 1 specimen, photo by "luciogiuniobruto" (IN) (https://www.inaturalist.org/observations/236444060); Capraia Isola, island of Capraia, 43.03986°N 9.81545°E (un. = 5000 m), 25.VII.2006, 1 specimen, photo by Wouter Beukema (IN) (https://www.inaturalist.org/observations/231416173); *idem*, 43.04635°N 9.84223°E (un. = 362 m), 27.VII.2023, 1 specimen, photo by Paolo Soldani (IN) (https://www.inaturalist.org/observations/175260686); Portoferraio, island of Elba, near Fortezza del Volterraio, 42.80063°N 10.38019°E (un. = 4 m), 2 specimens (female and male), photo by Roberto Barsaglini (IN) (https://www.inaturalist.org/observations/233155085); Porto Azzurro, island of Elba, Santuario della Madonna di Monserrato, 42.78420°N 10.39205°E (un. = 180 m), 5.VIII.2010, 1 specimen, photo by Andrea Benocci (IN) (https://www.inaturalist.org/observations/116253734); Campo nell'Elba, island of Elba, near Monte Capanne, 42.76610°N 10.17137°E (un. = 14 m), 1.IX.2021, 1 specimen, photo by "thomas__ma" (IN) (https://www.inaturalist.org/observations/96932322); Capoliveri, island of Elba, 42.73749°N 10.39548°E (un. not recorded), 26.VII.2024, 1 specimen, photo by "kaspartom" (IN) (https://www.inaturalist.org/observations/237711829); *idem*, near Vetrangoli beach, 42.71595°N 10.41332°E (un. not recorded), 26.VII.2024, 1 specimen, photo by Riccardo Molajoli (IN) (https://www.inaturalist.org/observations/174509434); Campo nell'Elba, island of Pianosa, 42.58838°N 10.10129°E (un. = 1 m), 29.VI.2025, a specimen (Fig. 1), photo by Filippo Ceccolini (IN) (https://www.inaturalist.org/observations/294165005); Grosseto, Castiglione della Pescaia, 42.75848°N 10.91595°E (un. = 264 m), 6.VII.1991, 1 specimen, photo by Bruno Parisotto (IN) (https://www.inaturalist.org/observations/152158574); Grosseto, Principina a Mare, 42.68457°N 11.00214°E (un. = 5 m), 6.VII.2023, 1 specimen, photo by Paolo Verucci

(IN) (https://www.inaturalist.org/observations/176984480); *idem*, Maremma Regional Park, 42.63768°N 11.06719°E (un. = 4 m), 12.VII.2024, 1 specimen, photo by "jprado" (IN) (https://www.inaturalist.org/observations/232421978); Orbetello, Camping Village Africa, 42.52666°N 11.18744°E (un. = 102 m), 21.VI.2025, 1 specimen, photo by "etrusko25" (IN) (https://www.inaturalist.org/observations/291416942); Isola del Giglio, island of Giglio, 42.37550°N 10.89104°E (un. = 4 m), 22.VIII.2022, 1 specimen, photo by Riccardo Riva (IN) (https://www.inaturalist.org/observations/132054276); *idem*, 42.36742°N 10.86967°E (un. = 2750 m), 8.IX.2004, 1 specimen, photo by "giulio_13" (IN) (https://www.inaturalist.org/observations/13387406); *idem*, 42.35811°N 10.89586°E (un. = 517 m), 2.IX.2021, 1 specimen, photo by Rym Nouioua (IN) (https://www.inaturalist.org/observations/93451440); *idem*, 42.35760°N 10.89808°E (un. = 12 m), 15.VIII.2024, 1 specimen, photo by "hel96" (IN) (https://www.inaturalist.org/observations/235925708); *idem*, 42.35453°N 10.88186°E (un. = 127 m), 9.VII.2024, 1 specimen, photo by Alessandro Castrini (IN) (https://www.inaturalist.org/observations/228272697); *idem*, 42.35270°N 10.88151°E (un. = 4 m), 30.VII.2024, 1 specimen, photo by "filippo_" (IN) (https://www.inaturalist.org/observations/235105053); *idem*, island of Giannutri, 42.25568°N 11.11462°E (un. = 51 m), 18.IX.2023, 1 specimen, photo by Lorenzo Pasquali (IN) (https://www.inaturalist.org/observations/183830028). **Latium:** Viterbo, Monte Romano, 42.25430°N 11.93051°E (un. = 4 m), 13.VI.2024, 1 specimen, photo by "rcaccia" (IN) (https://www.inaturalist.org/observations/222545253); Metropolitan City of Rome Capital, Santa Marinella, Prato del Mare, 42.05583°N 11.83903°E (un. = 400 m), 30.VI.2024, 1 specimen, photo by "babunco" (IN) (https://www.inaturalist.org/observations/226316781); Tolfa, La Scaglia, 42.03741°N 11.96453°E (un. = 251 m), 11.VIII.2023, 1 specimen, photo by "pluvialfern" (IN) (https://www.inaturalist.org/observations/187882208); Roma, Lido di Ostia, 41.72582°N 12.30033°E (un. not recorded), 12.IX.2020, 1 specimen, photo by Lorenzo De Tomasi (IN) (https://www.inaturalist.org/observations/59302596); Frosinone, Veroli, Croce San Giacomo, 41.72163°N 13.40347°E (un. = 31 m), 23.VII.2023, 1 specimen, photo by "tanocaperna" (IN) (https://www.inaturalist.org/observations/182440009); Latina, Itri, 41.31402°N 13.48793°E (un. not recorded), 6.VII.2024, 1 specimen, photo by Leonardo Ancillotto (IN) (https://www.inaturalist.org/observations/227712056); *idem*, 41.25158°N 13.47172°E (un. = 8 m), 6.VIII.2024, 1 specimen, photo by "rocdac31" (IN) (https://www.inaturalist.org/observations/234181882); Sperlonga, 41.25133°N 13.44994°E (un. = 39 m), 28.VII.2023, 1 specimen, photo by Nicola Addelfio (IN) (https://www.inaturalist.org/observations/175692964); Ponza, island of Ponza, 40.93236°N 12.99072°E (un. = 401 m), 20.IX.2019, 1 specimen, photo by Andrea Benocci (IN) (https://www.inaturalist.org/observations/243968806); *idem*, 40.92029°N 12.96714°E (un. = 34 m), 18.IX.2017, 1 specimen, photo by Andrea Benocci (IN) (https://www.inaturalist.org/observations/105716522); *idem*, 40.89557°N 12.95897°E (un. = 1390 m), 5.IX.2013, 1 specimen, photo by "animanaturae" (IN) (https://www.inaturalist.org/observations/2312128); *idem*, via Punta Incenso, 11.IX.2024, 1 specimen, photo by Vittorio Risoldi (FEI) (http://www.entomologiitaliani.net/public/forum/phpBB3/viewtopic.php?f=421&t=105627&hilit=argiope); **Abruzzo:** L'Aquila, L'Aquila, 42.34414°N 13.44588°E (un. = 2 m), 21.VII.2024, 1 specimen, photo by Emanuele Santarelli (IN) (https://www.inaturalist.org/observations/230953390); Massa d'Albe, Forme, 42.11260°N 13.44546°E (un. = 451 m), 14.VIII.2019, 1 specimen, photo by Mattia De Vivo (IN) (https://www.inaturalist.org/observations/30824859); Pratola Peligna, 42.12360°N 13.90296°E (un. = 1320 m), 8.IX.2023, 1 specimen, photo by Danio Miserocchi (IN)

(https://www.inaturalist.org/observations/182977433); Pescara, Caramanico Terme, 42.1662°N 14.0427°E (un. = 36 m), 4.X.2023, 1 specimen, photo by "christelle" (OB) (https://observation.org/observation/302645048/); **Molise:** Campobasso, Campomarino, 41.94630°N 15.07375°E (un. = 15 m), 15.VII.2020, 1 specimen, photo by "jf28" (IN) (https://www.inaturalist.org/observations/53188468). **Campania:** Caserta, Castello del Matese, 41.36250°N 14.37785°E (un. = 137 m), 10.VII.2020, 1 specimen, photo by "gianluigif" (IN) (https://www.inaturalist.org/observations/60057226); Capua, near Sant'Angelo in Formis, 41.11884°N 14.27452°E (un. = 158 m), 22.VII.2021, 2 specimens (female and male) (Fig. 2), photo by "alconte" (IN) (https://www.inaturalist.org/observations/88107414). **Apulia:** Foggia, Chieuti, near Marina di Chieuti, 41.91930°N 15.18665°E (un. not recorded), 10.VII.2022, 1 specimen, photo by Daniel Li Veli (IN) (https://www.inaturalist.org/observations/141718329); Vieste, 41.91321°N 16.12463°E (un. = 1480 m), 13.VI.2024, 1 specimen, photo by "pevel65" (IN) (https://www.inaturalist.org/observations/222589201); Mattinata Lido Vignanotica, 41.76121°C 16.16448°E (un. = 187 m), 1 specimen, photo by Elena Di Ciano (IN) (https://www.inaturalist.org/observations/228990123); *idem*, near Baia delle Zagare, 41.753°N 16.156°E (un. not recorded), 22.VIII.2021, 1 specimen, photo by Simone Gautero (IN) (https://www.inaturalist.org/observations/92489676); Bovino, 41.24912°N 15.34220°E (un. = 802 m), 5.VIII.2020, 1 specimen, photo by "fra_21" (IN) (https://www.inaturalist.org/observations/85829009); Barletta-Andria-Trani, Andria, near Castel del Monte, 41.07636°N 16.27100°E (un. = 4 m), 19.VIII.2023, 1 specimen, photo by Mario Tarantino (IN) (https://www.inaturalist.org/observations/179311059); Minervino Murge, 41.04601°N 16.08682°E (un. = 524 m), 28.VIII.2009, 1 specimen, photo by Cristiano Liuzzi (IN) (https://www.inaturalist.org/observations/136731827); Taranto, Crispiano, 40.59924°N 17.32488°E (un. = 8 m), 15.VI.2025, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/289885396); Brindisi, San Vito dei Normanni, 40.6685°N 17.7354°E (un. not recorded), 20.VII.2024, 1 specimen, photo by Koen Thijsen (OB) (https://observation.org/observation/320011748/); Lecce, Lecce, 40.47361°N 18.13699°E (un. = 61 m), 1 specimen, photo by "animarandagia" (IN) (https://www.inaturalist.org/observations/180951222); *idem*, 40.45783°N 18.17831°E (un. = 15 m), 9.VII.2023, 1 specimen, photo by "animarandagia" (IN) (https://www.inaturalist.org/observations/171926235); *idem*, 40.40929°N 18.18713°E (un. = 31 m), 19.VII.2019, 1 specimen, photo by "gianfrancobdn" (IN) (https://www.inaturalist.org/observations/29396731); Porto Cesareo, Punta Prosciutto, 40.29298°N 17.76342°E (un. = 21 m), 10.VIII.2018, 1 specimen, photo by Daniele Saracino (IN) (https://www.inaturalist.org/observations/15292289); *idem*, near Torre Castiglione, 40.28591°N 17.82411°E (un. = 2 m), 24.VII.2023, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/176484343); *idem*, 40.28638°N 17.82996°E (un. = 4 m), 30.VII.2023, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/175756423); *idem*, 40.28616°N 17.83101°E (un. = 8 m), 23.VII.2023, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/176491499); *idem*, near Porto Cesareo, Riserva naturale regionale orientata Palude del Conte e Duna Costiera, 40.24510°N 17.90129°E (un. = 2 m), 8.VIII.2020, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/55800886); *idem*, 40.24462°N 17.90208°E (un. = 2 m), 20.VIII.2023, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/179544590); *idem*, 40.24391°N 17.90256°E (un. = 2 m), 1.VIII.2020, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/55013026); *idem*, 40.24411°N 17.90320°E (un.

= 2 m), 14.VII.2024, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/229304891); *idem*, 40.24386°N 17.90389°E (un. = 2 m), 10.VII.2020, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/54529327); *idem*, 40.24229°N 17.90586°E (un. = 4 m), 14.VII.2024, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/229304902); Nardò, 40.30163°N 17.91031°E (un. = 4 m), 3.VII.2024, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/227313147); *idem*, 40.29918°N 17.91707°E (un. = not recorded), 1.VIII.2021, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/90690618); *idem*, 40.29896°N 17.91705°E (un. = 2 m), 1.VIII.2021, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/90690614); *idem*, 40.20084°N 17.92282°E (un. = 2 m), 1.VII.2023, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/170436804); *idem*, 40.20673°N 17.97102°E (un. = 2 m), 2.VIII.2020, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/55529180); *idem*, 40.15909°N 17.95752°E (un. = 4 m), 16.VII.2024, 1 specimen, photo by Eddi Bisulli (IN) (https://www.inaturalist.org/observations/230269258); Leverano, 40.29716°N 17.93218°E (un. not recorded), 30.VII.2021, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/90299055); *idem*, 40.29477°N 17.94071°E (un. not recorded), 30.VII.2021, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/90299053); *idem*, 40.25981°N 17.96426°E (un. = 2 m), 9.VIII.2023, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/177683415); *idem*, 40.25098°N 17.95564°E (un. not recorded), 25.VII.2021, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/89814867); *idem*, 40.25269°N 17.96426°E (un. not recorded), 25.VII.2021, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/89814870); idem, 40.2518°N 17.97178°E (un. not recorded), 28.VII.2021, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/89826733); *idem*, 40.25424°N 17.97428°E (un. not recorded), 31.VII.2021, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/90318545); Martano, 40.22141°N 18.27805°E (un. = 9 m), 19.VII.2022, 1 specimen, photo by "ecs4el" (IN) (https://www.inaturalist.org/observations/126974457); Otranto, 40.10698°N 18.51921°E (un. = 15 m), 8.VIII.2022, 1 specimen, photo by Andrea Piccinini (IN) (https://www.inaturalist.org/observations/188131711); Ugento, Fontanelle, 39.87104°N 18.14182°E (un. = 8 m), 24.VII.2022, 1 specimen, photo by "tiz_bat" (IN) (https://www.inaturalist.org/observations/127646735); Salve, 39.86739°N 18.30203°E (un. = 452 m), 15.VII.2018, 1 specimen, photo by "fedelf" (IN) (https://www.inaturalist.org/observations/14546131). **Basilicata:** Matera, Policoro, 40.20224°N 16.61965°E (un. = 8 m), 1.VIII.2018, 1 specimen, photo by "pino78" (IN) (https://www.inaturalist.org/observations/15020260); Matera, 40.6730°N 16.6328°E (un. = 100 m), 9.VIII.2016, 1 specimen, photo by Johan Bos (OB) (https://observation.org/observation/122608696/); **Calabria:** Crotone, Strongoli, 39.26800°N 17.08471°E (un. = 8 m), 13.VIII.2019, 1 specimen, photo by "venpa" (IN) (https://www.inaturalist.org/observations/30764595); Crotone, Foci del Neto, 39.19728°N 17.14323°E (un. = 196 m), 12.VIII.2019, 1 specimen, photo by "frahome" (IN) (https://www.inaturalist.org/observations/56565509); Belvedere di Spinello, 39.19027°N 16.90777°E (un. not recorded), 23.VII.2020, 1 specimen, photo by Francesco Lillo (IN) (https://www.inaturalist.org/observations/72121209); Catanzaro,

Simeri Crichi, Simeri Mare, 38.86262°N 16.69358°E (un. = 4 m), 19.IX.2022, 1 specimen, photo by "hieraaetus" (IN) (https://www.inaturalist.org/observations/135650678); Catanzaro, 38.85894°N 16.59726°E (un. = 8 m), 4.VIII.2023, 1 specimen, photo by Roberto Ritrovato (IN) (https://www.inaturalist.org/observations/176991904); *idem*, 38.83799°N 16.60872°E (un. = 8 m), 1.IX.2023, 1 specimen, photo by Roberto Ritrovato (IN) (https://www.inaturalist.org/observations/181174153); Metropolitan City of Reggio Calabria, Caulonia, 38.34388°N 16.44688°E (un. = 21 m), 7.IX.2020, 1 specimen, photo by Luciano Arcorace (IN) (https://www.inaturalist.org/observations/59761626); Gerace, 38.27356°N 16.21641°E (un. = not recorded), 24.VII.2019, 1 specimen, photo by "uwegrabner" (IN) (https://www.inaturalist.org/observations/248638750); Cardeto, 38.0949°N 15.7520°E (un. = 11 m), 27.VIII.2024, 1 specimen, photo by Fabian Karwinkel (OB) (https://observation.org/observation/325916226/); Palizzi, 37.92490°N 16.05846°E (un. = 3 m), 2.VIII.2022, 1 specimen, photo by Alessandro Balletti (IN) (https://www.inaturalist.org/observations/129107638). **Sicily:** Metropolitan City of Messina, Lipari, island of Alicudi, 38.5475°N 14.35133°E (un. not recorded), 16.VIII.2013, 1 specimen, photo by "figlue" (IN) (https://www.inaturalist.org/observations/18143411); *idem*, island of Filicudi, 38.56649°N 14.55970°E (un. = 3620 m), 8.IV.2006, 1 specimen, photo by "io-es" (IN) (https://www.inaturalist.org/observations/78491078); *idem*, island of Lipari, 38.48654°N 14.93367°E (un. = 30 m), 11.VIII.2020, 1 specimen, photo by "antorufo" (IN) (https://www.inaturalist.org/observations/56137431); *idem*, 38.46828°N 14.95465°E (un. not recorded), 24.IX.2018, 1 specimen, photo by Birger Reibisch (IN) (https://www.inaturalist.org/observations/135411201); *idem*, 38.51364°N 14.91226°E (un. not recorded), 8.VIII.2018, 1 specimen, photo by "oleelamhy" (IN) (https://www.inaturalist.org/observations/285281527); *idem*, island of Vulcano, 38.40630°N 14.94453°E (un. = 5 m), 18.IX.2021, 1 specimen, photo by "veoiaia" (IN) (https://www.inaturalist.org/observations/96052426); *idem*, 38.3850°N 14.9631°E (un. = 8 m), 18.X.2023, 1 specimen, photo by "MrNilson" (OB) (https://observation.org/observation/291010939/); Catania, Belpasso, 24.VIII.2016, 1 specimen, photo by Giovanni Altadonna (FEI) (http://www.entomologiitaliani.net/public/forum/phpBB3/viewtopic.php?f=421&t=70458&hilit=argiope); Enna, Nicosia, 37.75913°N 14.45006°E (un. not recorded), 7.VIII.2023, 1 specimen, photo by "vituzzo" (IN) (https://www.inaturalist.org/observations/177639979); Siracusa, Siracusa, near Punta Tavernara, 37.01660°N 15.32793°E (un. = 8 m), 6.IX.2021, 1 specimen, photo by Joey Bom (IN) (https://www.inaturalist.org/observations/103604447); *idem*, Capo Murro di Porco, 37.00318°N 15.33458°E (un. not recorded), 17.IX.2019, 1 specimen, photo by Luca Boscain (IN) (https://www.inaturalist.org/observations/33361610); Canicattini Bagni, 37.00075°N 15.0688°E (un. = 10 m), 19.VIII.2023, 1 specimen, photo by Gabriel Benavides (IN) (https://www.inaturalist.org/observations/192093192); Montagna, 36.95353°N 15.10025°E (un. not recorded), 19.IX.2020, 1 specimen, photo by Luca Boscain (IN) (https://www.inaturalist.org/observations/61397316); Caltanisetta, San Cataldo, 37.4679°N 13.9141°E (un. = 5 m), 17.VIII.2024, 1 specimen, photo by Els Guarneri (OB) (https://observation.org/observation/324593934/); Gela, 37.10218°N 14.35381°E (un. = 5 m), 17.VIII.2022, 1 specimen, photo by Petra Cattano (IN) (https://www.inaturalist.org/observations/131192836); Caltanisetta, 37.09881°N 14.34273°E (un. = 30 m), 14.X.2023, 1 specimen, photo by Ruben Ciantia (IN) (https://www.inaturalist.org/observations/187826255); *idem*, 37.09860°N 14.34238°E (un. = 8 m), 14.X.2023, 1 specimen, photo by Ruben Ciantia (IN)

(https://www.inaturalist.org/observations/187826256); *idem*, Viale Trieste, 37.49403°N 14.04877°E (un. not recorded), 26.IX.2019, 1 specimen, photo by "ludovico99" (IN) (https://www.inaturalist.org/observations/33417271); Sutera, 37.52029°N 13.74610°E (un. = 8 m), 14.VIII.2020, 1 specimen, photo by Salvatore Infanti (IN) (https://www.inaturalist.org/observations/70039958); Agrigento, Cattolica Eraclea, 37.44089°N 13.40997°E (un. = 31 m), 19.VII.2021, 1 specimen, photo by Salvatore Infanti (IN) (https://www.inaturalist.org/observations/100077985); Siculiana, 37.33544°N 13.42166°E (un. = 1130 m), 9.VIII.2012, 1 specimen, photo by Tiziana Dinolfo (IN) (https://www.inaturalist.org/observations/63095244); *idem*, 37.35900°N 13.36713°E (un. = 19 m), 13.VI.2025, 2 specimens (female and male), photo by Matteo Forzese (IN) (https://www.inaturalist.org/observations/290251639); Agrigento, 37.29897°N 13.59902°E (un. = 50 m), 21.VIII.2019, 1 specimen, photo by "jc_bartolucci" (IN) (https://www.inaturalist.org/observations/103766031); *idem*, 37.28231°N 13.56180°E (un. = 1120 m), 7.VIII.1996, 1 specimen, photo by Fabio Cianferoni (IN) (https://www.inaturalist.org/observations/11318404); Lampedusa e Linosa, Linosa island, 35.87195°N 12.86381°E (un. = 11 m), 25.IX.2023, 1 specimen, photo by Marco Pecoraro (IN) (https://www.inaturalist.org/observations/184866308); *idem*, 35.87025°N 12.86375°E (un. not recorded), 14.X.2017, 1 specimen, photo by Francesco Cecere (IN), photo by Francesco Cecere (IN) (https://www.inaturalist.org/observations/8547954); Trapani, San Vito Lo Capo, 38.14483°N 12.73575°E (un. = 5 m), 1.VIII.2021, 1 specimen, photo by Emilio Taggi (IN) (https://www.inaturalist.org/observations/89484440); *idem*, 38.12429°N 12.78774°E (un. = 488 m), 20.VIII.2008, 1 specimen, photo by Riccardo Molajoli (IN) (https://www.inaturalist.org/observations/67327434); Custonaci, 38.10988°N 12.68082°E (un. not recorded), 22.VII.2023, 1 specimen, photo by Salvatore Infanti (IN) (https://www.inaturalist.org/observations/174273187); Buseto Palizzolo, 38.02915°N 12.69791°E (un. not recorded), 12.IX.2021, 1 specimen, photo by Massimiliano Finzi (IN) (https://www.inaturalist.org/observations/94736430); Trapani, 37.93065°N 12.66138°E (un. = 6 m), 5.IX.2024, 1 specimen, photo by Fabrizio Reginato (IN) (https://www.inaturalist.org/observations/239977084); Pantelleria, Pantelleria island, 36.80756°N 11.99426°E (un. = 8 m), 26.IX.2019, 1 specimen, photo by Leonardo Ancillotto (IN) (https://www.inaturalist.org/observations/33448737); *idem*, 36.78026°N 12.00579°E (un. = 1880 m), 9.VIII.2020, 1 specimen, photo by "adtll" (IN) (https://www.inaturalist.org/observations/55960746); *idem*, 36.76853°N 12.00031°E (un. = 13 m), 9.IX.2023, 1 specimen, photo by Lorenzo Giulivi (IN) (https://www.inaturalist.org/observations/182532198); *idem*, 36.75138°N 11.99705°E (un. = 2500 m), 2.XI.2022, 1 specimen, photo by Alessandra Pucci (IN) (https://www.inaturalist.org/observations/140895547); Castelvetrano, 37.6680°N 12.8938°E (un. = 4 m), 6.VIII.2024, 1 specimen, photo by "margriet" (OB) (https://observation.org/observation/323001162/); Palermo, Palermo, Capo Gallo, 38.21666°N 13.31666°E (un. = 1700 m), 9.VII.2014, 1 specimen, photo by "ilmadonita" (IN) (https://www.inaturalist.org/observations/776386); *idem*, Pizzo Manolfo, 38.17690°N 13.27145°E (un. = 307 m), 30.VIII.2016, 1 specimen, photo by Marco Pecoraro (IN) (https://www.inaturalist.org/observations/70864580); Terrasini, 38.08897°N 13.07801°E (un. = 9 m), 30.VII.2024, 1 specimen, photo by Giulia Bigazzi (IN) (https://www.inaturalist.org/observations/232708159); Monreale, near Casaboli, 38.07158°N 13.23044°E (un. = 31 m), 1 specimen, photo by Giorgio De Simone (IN) (https://www.inaturalist.org/observations/53368650); Porticello, 38.09432°N 13.53099°E (un. = 151 m), 16.VIII.2023, 1 specimen, photo by Max Göricke (IN) (https://www.inaturalist.org/observations/179493957). **Sardinia:** Gallura Nord-Est

Sardegna, Luogosanto, 19.VII.2019, 1 specimen, photo by Luciano Lucci (FEI) (http://www.entomologiitaliani.net/public/forum/phpBB3/viewtopic.php?f=421&t=85637&hilit=argiope); Santa Teresa Gallura, 41.24291°N 9.14354°E (un. not recorded), 19.IX.2023, 1 specimen, photo by "fx64" (IN) (https://www.inaturalist.org/observations/184099087); *idem*, 41.20887°N 9.17835°E (un. = 80 m), 28.VII.2024, 1 specimen, photo by Olivier De Clerck (IN) (https://www.inaturalist.org/observations/235182725); Arzachena, Faro di Capo Ferro, 41.15496°N 9.52325°E (un. = 178 m), 16.VI.2024, 1 specimen, photo by "swsankt" (IN) (https://www.inaturalist.org/observations/228404124); *idem*, near Monticanaglia, 41.07342°N 9.48706°E (un. = 7 m), 12.VII.2023, 1 specimen, photo by "eli_12" (IN) (https://www.inaturalist.org/observations/172471989); Trinità d'Agultu e Vignola, 41.01393°N 8.87896°E (un. = 3 m), 4.VII.2021, 1 specimen, photo by "dp92" (IN) (https://www.inaturalist.org/observations/85632663); *idem*, 40.99015°N 8.87533°E (un. = 462 m), 7.VIII.2024, 1 specimen, photo by "alexander_a" (IN) (https://www.inaturalist.org/observations/234418360); *idem*, 40.97026°N 8.96316°E (un. = 16 m), 30.VII.2024, 1 specimen, photo by "giovilazzari" (IN) (https://www.inaturalist.org/observations/232786339); Olbia, Tavolara island, 40.90083°N 9.70173°E (un. = 100 m), 22.VII.2010, 1 specimen, photo by Lorenzo Cecchi (IN) (https://www.inaturalist.org/observations/269950477); San Teodoro, Capo Coda Cavallo, 40.84082°N 9.72339°E (un. = 194 m), 26.VII.2024, 1 specimen, photo by Nicoletta Coniglio (IN) (https://www.inaturalist.org/observations/252255516); Sassari, La Maddalena, Caprera island, Stagnali, 41.19585°N 9.45486°E (un. = 244 m), 22.VII.2019, 1 specimen, photo by "lanius2016" (IN) (https://www.inaturalist.org/observations/180893641); Metropolitan City of Sassari, Stintino, 40.90080°N 8.22007°E (un. = 24 m), 30.VI.2018, 1 specimen, photo by "mak" (IN) (https://www.inaturalist.org/observations/13937647); Cargeghe, 40.66863°N 8.61317°E (un. = 473 m), 11.IX.2024, 1 specimen, photo by "araj" (IN) (https://www.inaturalist.org/observations/241067920); Alghero, Parco Naturale Regionale di Porto Conte, 40.60306°N 8.23888°E (un. = 614 m), 4.VII.2021, 1 specimen, photo by "fulvio86" (IN) (https://www.inaturalist.org/observations/94570031); Nuoro, Siniscola, 40.52116°N 9.61898°E (un. = 6 m), 24.VII.2021, 1 specimen, photo by Francesca Graziani (IN) (https://www.inaturalist.org/observations/91110951); *idem*, 40.48042°N 9.81041°E (un. not recorded), 14.VII.2024, 2 specimens (female and male), photo by Martin Scheuch (IN) (https://www.inaturalist.org/observations/229363259); Orosei, Cala Liberotto, 40.44331°N 9.77979°E (un. not recorded), 7.VII.2023, 1 specimen, photo by Sam Shotter (IN) (https://www.inaturalist.org/observations/171520885); *idem*, 40.44481°N 9.79133°E (un. = 7 m), 8.VII.2021, 1 specimen, photo by "balsim" (IN) (https://www.inaturalist.org/observations/86145353); Nuoro, 40.32231°N 9.33249°E (un. = 526 m), 29.VIII.2019, 1 specimen, photo by "moros" (IN) (https://www.inaturalist.org/observations/31734119); Baunei, 40.01966°N 9.67969°E (un. = 17 m), 22.VII.2021, 1 specimen, photo by Fabio Cianferoni (IN) (https://www.inaturalist.org/observations/94242326); Ilbono, 39.89242°N 9.54969°E (un. = 928 m), 3.VIII.2020, 1 specimen, photo by "ocram1977" (IN) (https://www.inaturalist.org/observations/55269379); Oristano, Cuglieri, near Istrampu de Iscala de S'Atentu, 40.14574°N 8.46840°E (un. = 8 m), 9.VI.2022, 1 specimen, photo by Emanuele Santarelli (IN) (https://www.inaturalist.org/observations/121861192); Cabras, San Giovanni di Sinis, 39.88091°N 8.43874°E (un. = 1050 m), 30.VI.2011, 1 specimen, photo by "damhcailin" (IN) (https://www.inaturalist.org/observations/37382979); *idem*, near Torre Grande, 39.89052°N 8.54361°E (un. = 792 m), 24.VI.2024, 1 specimen, photo

by “swsankt” (IN) (https://www.inaturalist.org/observations/229015056); Arborea, 39.80393°N 8.54813°E (un. = 23 m), 17.VIII.2024, 1 specimen, photo by “pier39” (IN) (https://www.inaturalist.org/observations/236310047); Sud Sardegna, Arbus, Capo Pecora, 39.45666°N 8.38444°E (un. not recorded), 30.V.2024, 1 specimen, photo by Roel van Klink (IN) (https://www.inaturalist.org/observations/219392624); Carloforte, San Pietro island, 39.14419°N 8.22535°E (un. = 344 m), 29.VII.2013, 1 specimen, photo by Filippo Melis (IN) (https://www.inaturalist.org/observations/10381107); *idem*, 39.12622°N 8.30452°E (un. not recorded), 6.IX.2018, 1 specimen, photo by Greta Nero (IN) (https://www.inaturalist.org/observations/83938458); Sant’Antioco, Sant’Antioco island, 39.06448°N 8.45508° E (un. = 1220 m), 7.VII.2023, 1 specimen, photo by “lizzypozzy” (IN) (https://www.inaturalist.org/observations/171525815); *idem*, Coaquaddus, 38.98239°N 8.44168°E (un. = 12 m), 12.VIII.2023, 1 specimen, photo by Jeroen Van Akkeren (IN) (https://www.inaturalist.org/observations/177968982); Villaputzu, 39.51024°N 9.59547°E (un. not recorded), 17.VII.2023, 2 specimens (female and male), photo by Gabriele Santagati (IN) (https://www.inaturalist.org/observations/173797256); Metropolitan City of Cagliari, Muravera, 39.37547°N 9.60164°E (un. = 9 m), 3.IX.2024, 1 specimen, photo by “unsertauchshopgraz” (IN) (https://www.inaturalist.org/observations/239575423); *idem*, 39.31315°N 9.61112°E (un. = 8 m), 26.VIII.2018, 1 specimen, photo by “steefanoc” (IN) (https://www.inaturalist.org/observations/15904648); Quartucciu, 39.24286°N 9.30491°E (un. = 2 m), 15.VII.2018, 1 specimen, photo by Pier Francesco Murgia (IN) (https://www.inaturalist.org/observations/198656795); *idem*, 39.25510°N 9.28692°E (un. not recorded), 9.VII.2023, 1 specimen, photo by Gabriele Santagati (IN) (https://www.inaturalist.org/observations/172306503); *idem*, 39.26839°N 9.27321°E (un. = 342 m), 20.XI.2013, 1 specimen, photo by Mauro Antonio Melis (IN) (https://www.inaturalist.org/observations/540391).

Fig. 2. Male and female *Argiope lobata* from Capua, Campania (photo by “alconte”).

Fig. 3. Specimen of *Argiope trifasciata* from Lago Patria, Campania (photo by Francesco Santoro).

Argiope trifasciata (Forskål, 1775)

Campania: Napoli, Giugliano in Campania, Lago Patria, 40.92870°N 14.02899°E (un. not recorded), 7.XII.2024, 1 specimen (Fig. 3), photo by Francesco Santoro (IN) (https://www.inaturalist.org/observations/254403616). **Apulia:** Lecce, Porto Cesareo, Punta Prosciutto, 40.30621°N 17.76731°E (un. = 2 m), 14.VII.2024, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/229301473); *idem*, 40.29608°N 17.76508°E (un. = 2 m), 16.X.2022, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/139032488); Copertino, 40.27270°N 18.04864°E (un. = 3060 m), 7.VII.2024, 2 specimens (female and male), photo by Francesco Tarantino (IN) (https://www.inaturalist.org/observations/227639039); Leverano, 40.25973°N 17.96390°E (un. = 2 m), 2.IX.2020, 1 specimen, photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/58320645); Porto Cesareo, 40.24856°N 17.89798°E (un. = 958 m), 14.XI.2023, 1 specimen, photo by Francesco Tarantino (IN) (https://www.inaturalist.org/observations/191029739); Nardò, near Villaggio Resta, 40.18837°N 17.93121°E (un. = 2 m), 19.XI.2021, 1 specimen,

photo by Valentino Traversa (IN) (https://www.inaturalist.org/observations/102408210). **Calabria:** Crotone, Isola di Capo Rizzuto, near Santa Domenica, 38.91988°N 17.05488°E (un. = 100 m), 20.VII.2024, 1 specimen, photo by "frahome" (IN) (https://www.inaturalist.org/observations/233357915); Catanzaro, Catanzaro, Corvo, 38.84400°N 16.61351°E (un. not recorded), 16.X.2023, 1 specimen, photo by Roberto Ritrovato (IN) (https://www.inaturalist.org/observations/187789038). **Sicily:** Metropolitan City of Messina, Milazzo, 38.26909°N 15.22773°E (un = 122 m), 31.VII.2023, 1 specimen, photo by Andrea Ruggeri (IN) (https://www.inaturalist.org/observations/179091277); *idem*, 38.20362°N 15.24037°E (un. = 20 m), 20.VIII.2020, 1 specimen, photo by "silvio_la_rosa" (IN) (https://www.inaturalist.org/observations/113256170); Catania, Zafferana Etnea, 37.66619°N 15.12110°E (un. = 191 m), 12.XII.2023, 1 specimen, photo by Simone Fontana (IN) (https://www.inaturalist.org/observations/193783182); Acireale, Riserva Naturale La Timpa, 37.63347°N 15.16888°E (un. = 409 m), 20.VII.2020, 1 specimen, photo by "ale0801" (IN) (https://www.inaturalist.org/observations/53729438); Aci Castello, 37.55578°N 15.14447°E (un. = 3230 m), 24.XII.2018, 1 specimen, by Simone Fontana (IN) (https://www.inaturalist.org/observations/129738931); *idem*, Cannizzaro, 37.53569°N 15.12798°E (un. = 193 m), 14.III.2021, 1 specimen, photo by Simone Fontana (IN) (https://www.inaturalist.org/observations/129727365); Catania, near Via Empedocle, 37.52082°N 15.08329°E (un. = 191 m), 9.II.2025, 1 specimen, photo by "benny02" (IN) (https://www.inaturalist.org/observations/286506586); *idem*, near Via Fulci, 37.52000°N 15.08398°E (un. not recorded), 28.X.2024, 1 specimen, photo by "axelnat" (IN) (https://www.inaturalist.org/observations/249494702); *idem*, near Via Androne, 37.51089°N 15.07998°E (un. not recorded), 10.XI.2023, 1 specimen, photo by "maria_p10" (IN) (https://www.inaturalist.org/observations/190591485); *idem*, Vaccarizzo-Delfino, 37.38083°N 15.08611°E (un. not recorded), 18.III.2024, 1 specimen, photo by "gabrieleuhl" (IN) (https://www.inaturalist.org/observations/202963204); Siracusa, Lentini, 26.X.2012, 1 specimen, photo by Sebastiano Parisi (FEI) (http://www.entomologiitaliani.net/public/forum/phpBB3/viewtopic.php?f=421&t=40012&hilit=argiope);
Palazzolo Acreide, 10.XII.2019, 1 specimen, photo by Riccardo La Placa (FEI) (http://www.entomologiitaliani.net/public/forum/phpBB3/viewtopic.php?f=421&t=88555&hilit=argiope); Pachino, VI.2015, 1 specimen, photo by Paolo Galasso (FEI) (http://www.entomologiitaliani.net/public/forum/phpBB3/viewtopic.php?f=421&t=62615&hilit=argiope); Palermo, Partinico, near Sicciarotta-Calatubo, 38.02972°N 12.98589°E (un. not recorded), 15.IX.2023, 1 specimen, photo by Vincenzo Rizzo (IN) (https://www.inaturalist.org/observations/183367339); Agrigento, Siculiana, Riserva Naturale Orientata Torre Salsa, 37.37493°N 13.32050°E (un. = 54 m), 27.X.2024, 1 specimen, photo by "livia_b" (IN) (https://www.inaturalist.org/observations/249346861); Agrigento, Pisciotto Carrubella, 37.12364°N 13.85710°E (un. = 5 m), 28.IX.2021, 1 specimen, photo by "mirkob29" (IN) (https://www.inaturalist.org/observations/125992190); Lampedusa e Linosa, Lampedusa island, 35.51161°N 12.62324°E (un. = 868 m), 23.VII.2001, 1 specimen, photo by Fabio Cianferoni (IN) (https://www.inaturalist.org/observations/11310695); Caltanisetta, Gela, Via Pavlov, 37.07738°N 14.24956°E, 15.III.2024, 1 specimen, photo by "fleexiin_yxki" (IN) (https://www.inaturalist.org/observations/202519036); Butera, Comunelli lake, 37.15894°N 14.15561°E (un. = 613 m), 17.V.2017, 1 specimen, photo by "lui_can" (IN) (https://www.inaturalist.org/observations/61714349); Ragusa, Modica, Serrapero II, 36.85570°N 14.81153°E (un. = 444 m), 4.XII.2023, 1 specimen, photo by "pietro77" (IN) (https://www.inaturalist.org/observations/193030622); Trapani, Pantelleria, Pantelleria

island, 36.81353°N 12.01587°E (un. = 5 m), 27.VII.2020, photo by "gaia" (IN) (https://www.inaturalist.org/observations/54579723); *idem*, 36.75138°N 11.99705°E (un. = 2500 m), 2.XI.2022, 1 specimen, photo by Alessandra Pucci (IN) (https://www.inaturalist.org/observations/140896116); **Sardinia:** Gallura Nord-Est Sardegna, Santa Teresa di Gallura, Ruoni, 41.21939°N 9.22390°E (un. = 15 m), 13.I.2020, 1 specimen, photo by Nico Nimbo (IN) (https://www.inaturalist.org/observations/38057965); Oristano, Cabras, near Torre Grande, 39.90867°N 8.49018°E (un. = 437 m), 21.VI.2024, 2 specimens (female and male), photo by "swsankt" (IN) (https://www.inaturalist.org/observations/228821084); *idem*, Stagno di Cabras, 39.9528°N 8.5062°E (un. not recorded), 25.IV.2025, 1 specimen, photo by Rainer Timm (OB) (https://observation.org/observation/346546100/); Sud Sardegna, Guasila, 39.55551°N 9.04416°E (un. = 61 m), 25.X.2019, 1 specimen, photo by Michele Caria (IN) (https://www.inaturalist.org/observations/38766113); Gonnessa, 39.25785°N 8.45957°E (un. = 305 m), 11.I.2019, 1 specimen, photo by Lorenzo Pinna (IN) (https://www.inaturalist.org/observations/19569605); Portoscuso, 39.16863°N 8.42017°E (un. = 4 m), 24.XI.2023, 1 specimen, photo by "michi100" (IN) (https://www.inaturalist.org/observations/193784588#data_quality_assessment); Carbonia, 39.14528°N 8.53076°E (un. = 52 m), 10.X.2021, photo by "mirko_92" (IN) (https://www.inaturalist.org/observations/194209993); San Giovanni Suergiu, 39.0554°N 8.5477°E (un. = 37 m), 2.XI.2022, 1 specimen, photo by Matteo Diana (OB) (https://observation.org/observation/258863937/); Villacidro, Turrighedda, 3.X.2008, 1 specimen, photo by Giancarlo Dessì (FEI) (http://www.entomologiitaliani.net/public/forum/phpBB3/viewtopic.php?f=421&t=28861&hilit=argiope); Metropolitan City of Cagliari, Assemini, 39.31724°N 8.99713°E (un. = 17 m), 7.X.2021, 1 specimen, photo by Andrea Adelfio (IN) (https://www.inaturalist.org/observations/97436072); *idem*, 39.29745°N 9.03406°E (un. not recorded), 9.VI.2017, photo by Paolo Zedda (IN) (https://www.inaturalist.org/observations/49407164); Selargius, 39.26120°N 9.15218°E (un. not recorded), 11.VI.2023, 1 specimen, photo by Gabriele Santagati (IN) (https://www.inaturalist.org/observations/166895144); *idem*, 39.25345°N 9.16830°E (un. = 18 m), 12.IX.2015, 1 specimen, photo by Filippo Melis (IN) (https://www.inaturalist.org/observations/41843586); Quartu Sant'Elena, Molentargius-Saline regional natural park, 39.22228°N 9.16634°E (un. = 75 m), 13.XI.2022, 1 specimen, photo by "indianachiccs" (IN) (https://www.inaturalist.org/observations/142160423); Maracalagonis, 39.26926°N 9.27389°E (un. = 438 m), 20.XII.2013, 1 specimen, photo by Mauro Antonio Melis (IN) (https://www.inaturalist.org/observations/540364); Quartucciu, 39.25384°N 9.28201°E (un. not recorded), 1.X.2023, 1 specimen, photo by Gabriele Santagati (IN) (https://www.inaturalist.org/observations/186373170); *idem*, Mela Murgia, 39.24252°N 9.30514°E (un. not recorded), 27.X.2018, 1 specimen, photo by Pier Francesco Murgia (IN) (https://www.inaturalist.org/observations/198005483); Uta, Gutturu Mannu regional natural park, 39.18121°N 8.90630°E (un. = 61 m), 20.IX.2019, 1 specimen, photo by "elbebiber" (IN) (https://www.inaturalist.org/observations/103653424); Muravera, 39.30877°N 9.62000°E (un. = 4 m), 7.X.2021, 1 specimen, photo by Sebastian Pilloni (IN) (https://www.inaturalist.org/observations/97434608); Villa San Pietro, 39.03677°N 8.99582°E (un. = 21 m), 6.II.2022, 1 specimen, photo by "elis76-nature" (IN) (https://www.inaturalist.org/observations/106241349); Pula, 38.99810°N 9.00908°E (un. not recorded), 27.IV.2023, 1 specimen, photo by Sofia Giakoumi (IN) (https://www.inaturalist.org/observations/156915135).

Discussion

The knowledge of the distribution in Italy of *A. lobata* and *A. trifasciata* is significantly increased. The latter species was known only so far from about ten localities and the present work adds 52 new records. In particular, *A. trifasciata* is recorded for the first time from Campania and Apulia, in addition to several new provinces in the region where the species was known—Crotone and Catanzaro for Calabria; Messina, Palermo, Caltanisetta and Trapani (in the Lampedusa island) for Sicily; Gallura Nord-Est Sardegna and Oristano for Sardinia (see Pantini & Isaia, 2019). Further studies will be necessary to verify the eventual spreading of this spider species in Italy.

Although its impressive habitus, the records of *A. lobata* in Italy are scattered and the knowledge of its distribution is not satisfactory for lacking of research. This paper partially fills this knowledge gap giving a lot of new records and in particular recording the species for the first time from Piedmont, Friuli-Venezia Giulia, Liguria, Abruzzo and Molise. In the other regions several new provinces are added to those in which *A. lobata* was known—Reggio Emilia for Emilia-Romagna; Lucca and Pisa for Tuscany; Viterbo and Frosinone for Latium; Caserta for Campania; Barletta-Andria-Trani and Brindisi for Apulia; Crotone and Catanzaro for Calabria; Siracusa and Caltanisetta for Sicily; Gallura Nord-Est Sardegna and Oristano for Sardinia (see Pantini & Isaia, 2019).

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Natural occurrence of potential predatory interaction between the spider *Argiope lobata* (Pallas, 1772) and the bird *Serinus serinus* (Linnaeus, 1766) in north-eastern Algeria

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Abstract

During a morning field survey in the Ain M'lila area, Oum El Bouaghi, North-eastern Algeria, an adult *Argiope lobata* spider was observed in its web with a European serin (*Serinus serinus*) trapped in the sticky threads. This may be considered a case of predation.

Keywords: *Argiope lobata*, *Serinus serinus*, Ain M'lila, predation, Algeria.

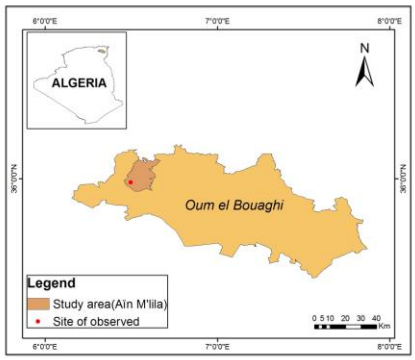
Introduction

The diet of orb-weaver spiders, family Araneidae, consists primarily of insects, particularly flying arthropods such as Diptera, Hymenoptera, and Lepidoptera (Blackledge *et al.*, 2009; Foelix, 2011). However, rare instances of vertebrate capture, including small birds and bats, have occasionally been reported in large web-building species (Nyffeler & Gibbons, 2022). The genus *Argiope* is widely distributed and renowned for its large, strong orb-webs capable of ensnaring relatively large prey items (Levi, 1983).

Here, we report a natural case of potential predatory interaction between *Argiope lobata* (Pallas, 1772) and the European serin *Serinus serinus* (Linnaeus, 1766) in North-eastern Algeria.

Material and Methods

The observation took place on 8 July 2025, during a daytime field survey at 10:00 AM in the Ain M'lila region, Oum El Bouaghi Province, North-eastern Algeria (Fig. 1). An adult *Argiope lobata* was observed in its orb-web, approximately 1 m in diameter, suspended on *Scirpus* plants about 1 m above the ground (Fig. 2). Field observations were conducted visually, with a focus on recording behavioural interactions between the spider and the entrapped prey.



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Figs. 1. Location map of the study area in Oum el Boughi North-eastern Algeria, showing the Ain M'lila location site. 2. Habitat overview. 3. European serin caught in web of *Argiope lobata*.

Results and Discussion

A European serin, *S. serinus*, was found entangled in the sticky spiral of the orb-web (Fig. 3). At the time of discovery, the bird was still alive, while the spider remained at the hub of the web without initiating any predatory behaviour during the ~10 min

observation period. The bird was carefully freed from the web and flew away without apparent injuries. Therefore, no evidence of venom injection, envenomation, or feeding was observed during this encounter.

To our knowledge, this represents the first reported case of a potential predatory interaction between *A. lobata* and *S. serinus* in Algeria. Large orb-weavers are occasionally capable of capturing small vertebrates, though confirmed predation (venom injection and feeding) is rare (Nyffeler & Gibbons, 2022). In this case, although no active attack was observed, the strong silk of *A. lobata* was sufficient to temporarily immobilize the bird.

Similar incidents involving passerine birds ensnared in spider webs have been documented elsewhere, such as a male Painted Bunting (*Passerina ciris*) caught in the web of the giant lichen orb-weaver (*Araneus bicentenarius*) in the USA (Queller & Murphy, 2019). Most known cases of bird entrapment in spider webs involve species with large webs, often *Nephila* spp., and very small birds, usually hummingbirds, and bats (Brooks, 2012; Nyffeler & Knörnschild, 2013). This pattern is likely related to the tensile strength of orb-weaver silk (Blackledge & Hayashi, 2006) and the low body mass of these birds, which makes them more susceptible to entanglement and less capable of breaking free.

Whether this event represents opportunistic predation or merely accidental entanglement remains uncertain. Nonetheless, it highlights the ability of large orb-webs to occasionally ensnare vertebrates and constitutes the first known case involving *S. serinus* in Algeria. Additional field observations are needed to assess the frequency and ecological significance of such events.

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A newly recorded genus for Turkish spider fauna (Araneae: Linyphiidae)

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Abstract

The spider species *Anguliphantes monticola* (Kulczyński, 1881) together with its genus *Anguliphantes* Saaristo & Tanasevitch, 1996, were found in central Anatolia and represent new record for Turkish spider fauna. Its general appearance and genital organs are photographed. Data on the description and collecting of the species *Anguliphantes monticola* are provided.

Keywords: Araneae, Linyphiidae, *Anguliphantes monticola*, new record, Türkiye.

Introduction

Family Linyphiidae is represented by 641 genera and 4962 species worldwide (World Spider Catalog, 2025) and by 159 species and 75 genera in Türkiye (Topçu *et al.*, 2005; Demir & Seyyar, 2017; Danışman *et al.*, 2025).

Material and Methods

One specimen of *Anguliphantes monticola* was collected from Elmalı Village, Niğde Province, Central Anatolia, Türkiye (Fig. 1). The specimen was preserved in 70% ethanol and is stored at Niğde Ömer Halisdemir University Arachnology Museum (NÖHUAM). For identification: Heimer & Nentwig (1991) and Wiehle (1956) were consulted and SZX7 Olympus stereomicroscope was used in identification.

Results

Family **Linyphiidae** Blackwall, 1859
Anguliphantes Saaristo & Tanasevitch, 1996
Anguliphantes monticola (Kulczyński, 1881)

Collected specimen: Niğde Province, Elmalı Village; 1♀, 29.03.2025, 37°59'57.4"N, 35°00'15.3"E, 1600 m, Leg. Z. İnan.

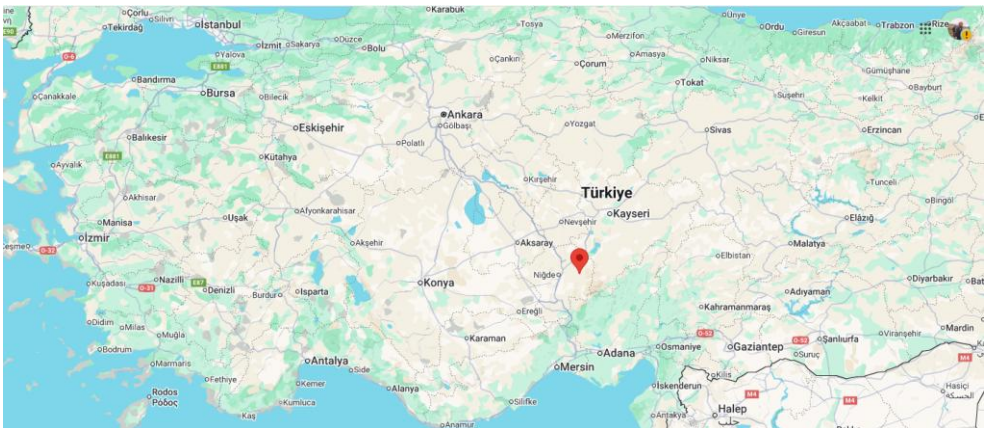

Fig. 1. Location of the *Anguliphantes monticola* species in Elmalı Village, Niğde Province, Central Anatolia Region, Türkiye.

Description notes: Female (Fig. 2) body length 2.3 mm. Prosoma is yellow-brown with dark edges. Legs are yellow-brown. The opisthosoma is blackish-grey. Epigyne as in Fig. (3). Vulva as in Fig. (4 a,b).
Global Distribution: Europe, Türkiye is a new record of this species.

Fig. 2. *Anguliphantes monticola* (Kulczyński, 1881) ♀ habitus, dorsal view.

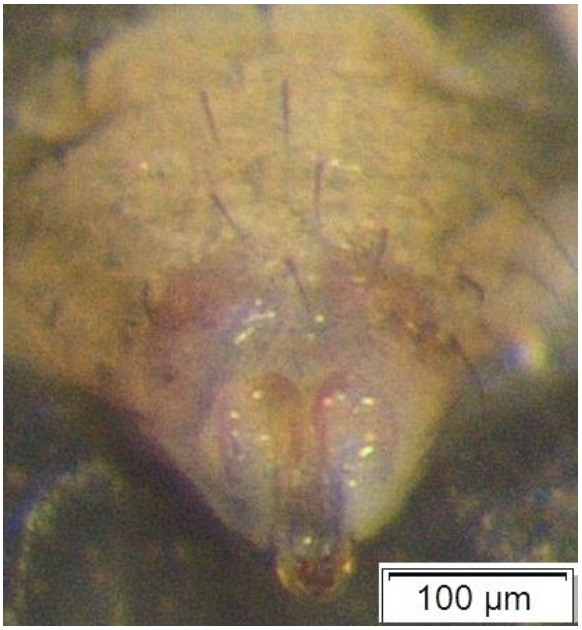

Fig. 3. *Anguliphantes monticola* (Kulczyński, 1881) ♀ epigyne, ventral view.

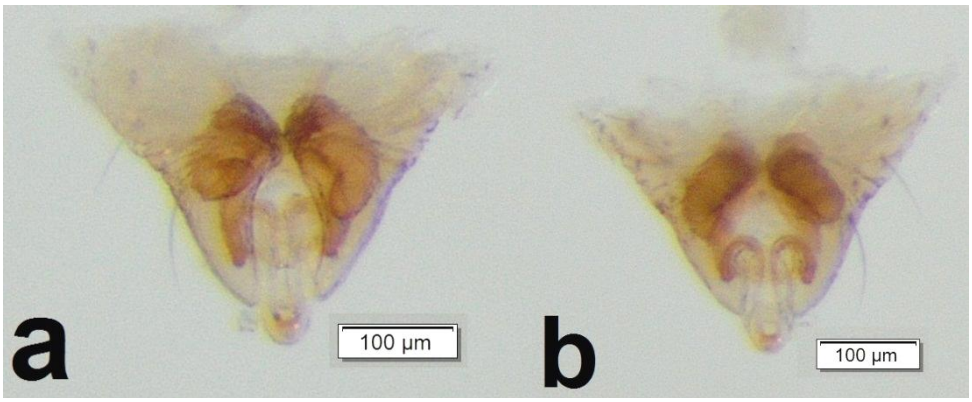

Fig. 4. *Anguliphantes monticola* (Kulczyński, 1881) ♀ vulva. a. dorsal view. b. ventral view.

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New record of *Oedothorax paludigena* Simon, 1926 (Araneae: Linyphiidae) from Türkiye

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Abstract

Oedothorax paludigena Simon, 1926 is recorded for the first time from Türkiye. Digital photographs and a map of distribution record of *O. paludigena* are provided. Description and collecting data of this species are also given.

Keywords: Linyphiidae, *Oedothorax paludigena*, new record, Türkiye.

Introduction

Linyphiidae is the second largest family of spiders, including 4962 species (World Spider Catalog, 2025). There are 159 species in 75 genera from this family recorded in Türkiye (Topçu *et al.*, 2005; Demir & Seyyar, 2017; Danışman *et al.*, 2025). The new record in this study raises the number of linyphiid species known from Türkiye to 160.

Material and Methods

Two male samples of *Oedothorax paludigena* Simon, 1926 were collected from Artvin province, Borçka district, Camili village and preserved in 70% ethanol after identification using SZX7 Olympus stereomicroscope. The examined samples were donated to the Niğde Ömer Halisdemir University Arachnology Museum (NÖHUAM).

Identification depended on Millidge (1975) and Pantini & Mazzoleni (2018).

Results

Family **Linyphiidae** Blackwall, 1859
Genus ***Oedothorax*** Bertkau, 1883
Oedothorax paludigena Simon, 1926

Material examined: Artvin province, Borçka district, Camili village, 41º23.221N, 41º51.212E, 1504 m, 2♂♂, 12.09.2009, leg. T. Türkeş.

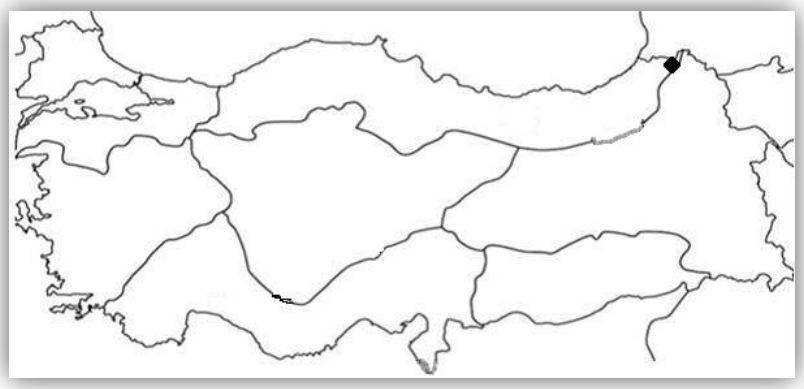

Fig. 1. Locality of *Oedothorax paludigena* Simon, 1926 in Türkiye.

Description notes: Male body length: 2.3 mm. Prosoma brown, sternum brown suffused with varying amounts of dark brown. Legs brown to orange-brown. Opisthosoma greyish black (Fig. 2). ♂ Pedipalp as in Fig. (3a,b).

Fig. 2. *Oedothorax paludigena* Simon, 1926 ♂, habitus.

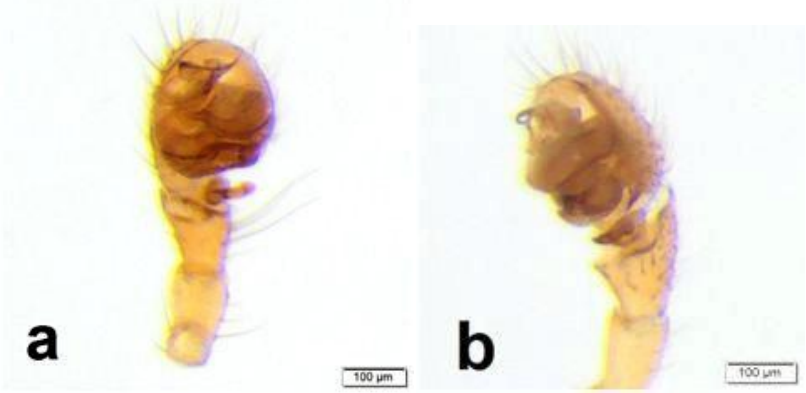

Fig. 3. *Oedothorax paludigena* Simon, 1926 ♂ Pedipalp. a. ventral view. b. retrolateral view.

Distribution: *Oedothorax paludigena* has been known until now from Spain, France (incl. Corsica), Italy (incl. Sardinia), Albania, Greece (World Spider Catalog, 2025). Türkiye is a new locality of this species.

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New locality record of *Stemonyphantes abantensis* Wunderlich, 1978 (Araneae: Linyphiidae) in Türkiye

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Abstract

Stemonyphantes abantensis was described by Wunderlich from Bolu Province, Abant district, Köroğlu mountains in Türkiye in 1978. This second record is from Kastamunu Province, Daday district, Ballı mountain in Türkiye. Its general habitus and female genitalia are illustrated. Short description and collecting data of this species are also given. Additionally, a map of the distribution records of *S. abantensis* is presented.

Keywords: Linyphiidae, *Stemonyphantes abantensis*, new locality, Türkiye.

Introduction

Family Linyphiidae Blackwall, 1859 is the second largest spider family in order Araneae and is currently represented by 4962 species belonging to 641 genera worldwide (World Spider Catalog, 2025). There are 159 species in 75 genera from this family listed for Türkiye (Topçu *et al.*, 2005; Demir & Seyyar, 2017; Danışman *et al.*, 2025). S*temonyphantes abantensis* Wunderlich, 1978 is known only from one locality in Türkiye, its type locality, in Bolu Province, Abant district, Köroğlu mountains of Türkiye (Wunderlich, 1978). This species is only occurring in Türkiye "endemic species" (World Spider Catalog, 2025). We could find the species in a new locality in Türkiye. Old and new localities of this species are shown on a Turkish regional map (Fig. 1). This new finding of the species widen its distribution in Türkiye.

Fig. 1. Localities of *Stemonyphantes abantensis* Wunderlich, 1978 in Türkiye. Old locality (■) and new locality ( ).

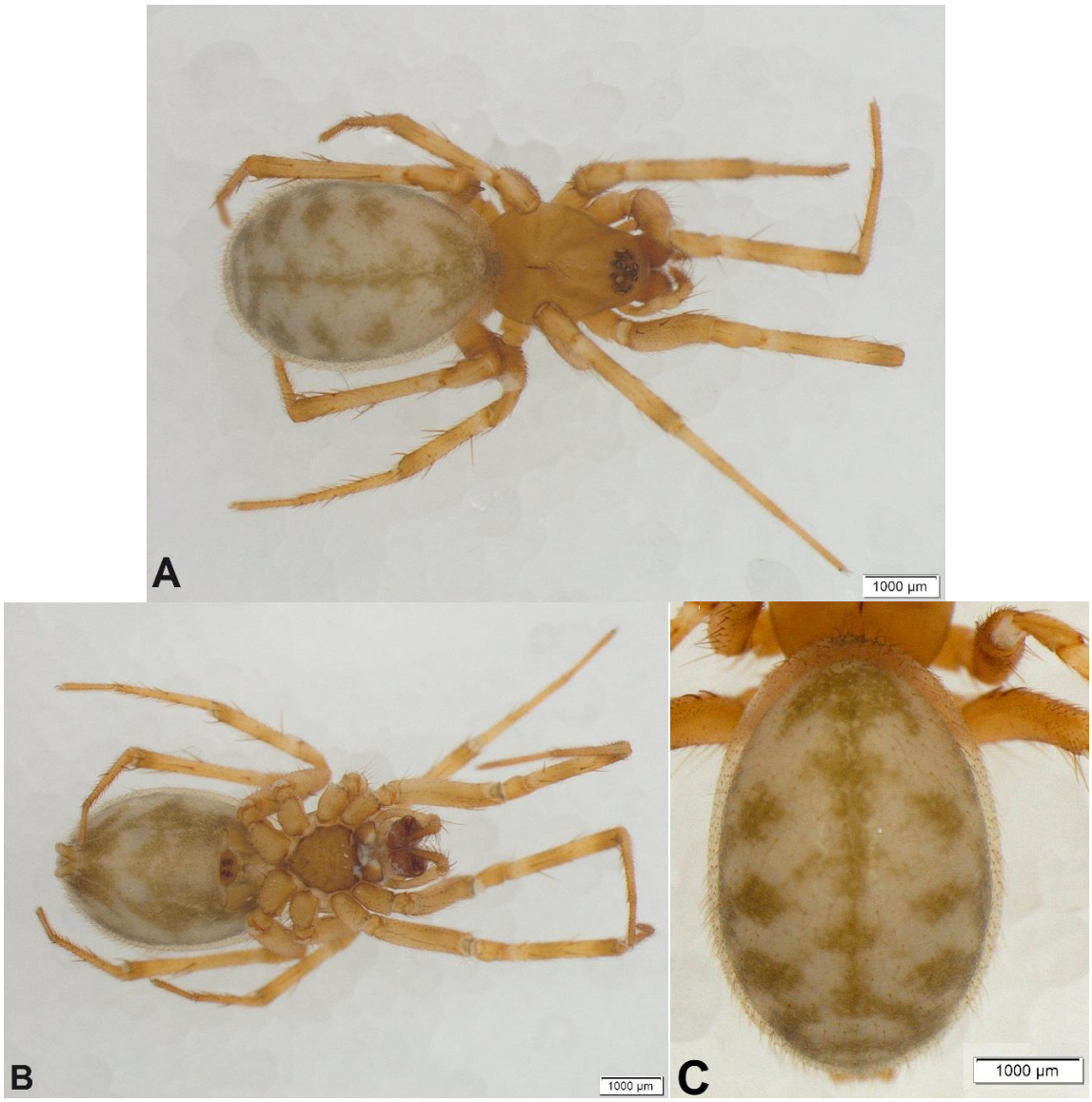

Fig. 2. S*temonyphantes abantensis* Wunderlich, 1978 ♀. A-B. Habitus. A. dorsal view. B. ventral view. C. Abdomen dorsal view.

Material and Methods

In this study, three female specimens of *Stemonyphantes abantensis* Wunderlich, 1978 were collected from Kastamunu Province, Daday district, Ballı mountain in Türkiye. Examined specimens were preserved in 70% ethanol and deposited in the Niğde Ömer Halisdemir University Arachnology Museum (NÖHUAM). For identification: Wunderlich (1978) was consulted. The identification was made by means of a SZX7 Olympus stereomicroscope.

Results

Family **Linyphiidae** Blackwall, 1859
Genus ***Stemonyphantes*** Menge, 1866
Stemonyphantes abantensis Wunderlich, 1978

Material examined: Kastamunu Province, Daday district, Ballı mountain, 41°32'56"N, 33°23'47"E, 1587 m, 3♀♀, 19.10.2007, leg. T. Türkeş.

Description notes: Female body length: 5.5-6 mm. Prosoma yellow-brown. Legs light yellow-brown. Opisthosoma light grey, dorsum with dark grey longitudinal band (Fig. 2 A,B,C). Epigyne as in Fig. (3A-B). Vulva as in Fig. (3C).

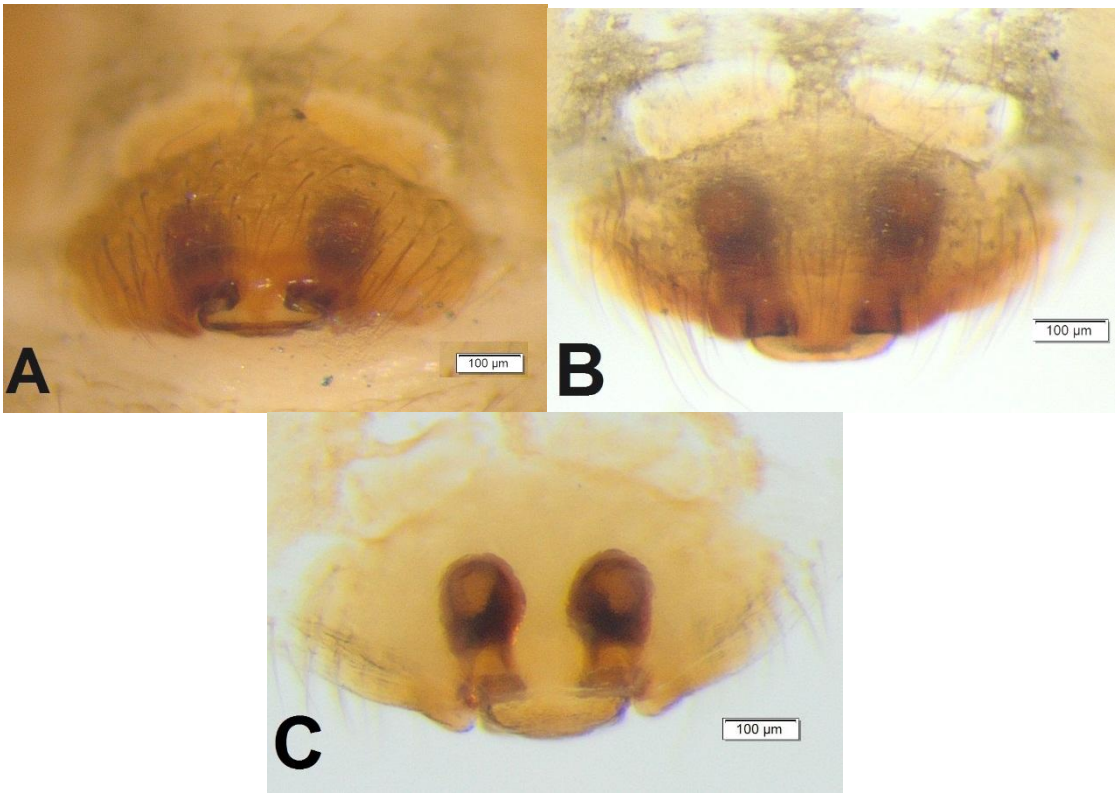

Fig. 3. *Stemonyphantes abantensis* Wunderlich, 1978 ♀. A-B. Epigyne, ventral view. C. Vulva, dorsal view.

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Serket (2025) vol. 21(1): 97-101.

New distribution record of the species *Thomisus unidentatus* Dippenaar-Schoeman & van Harten, 2007 (Araneae: Thomisidae) from Western India

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Abstract

The discovery and record of *Thomisus unidentatus* Dippenaar-Schoeman & van Harten, 2007 is documented for the first time from Gujarat state, India. This record contributes new distributional data for the Indian thomisid fauna and emphasizes the biogeographical significance of western India. A detailed morphological description and photographic illustrations of the male habitus and copulatory organs are provided along with an updated distribution map.

Keywords: Araneae, Fauna, Crab spider, Mangrove habitat, Kachchh, Taxonomy.

Introduction

The crab spider family Thomisidae Sundevall, 1833 currently comprises 2193 species in 171 genera worldwide (World Spider Catalog, 2025). In India, it consists of 175 extant species belonging to 42 genera (Caleb & Sankaran, 2025). The genus *Thomisus* Walckenaer, 1805 is widely distributed and consists of 137 species and 5 subspecies globally. Among these, 45 species have been documented in India (Caleb & Sankaran, 2025), of these, 12 species are known from Gujarat. Through recent field surveys, we identified one additional species of the genus *Thomisus* that have not been

documented in Gujarat state till date. Hence, the present paper deals with new record and documentation of the species *T. unidentatus* Dippenaar-Schoeman & van Harten, 2007, marking its first occurrence in Gujarat state, India.

Material and Methods

One male specimen was hand-collected and studied under a Zeiss SteREO Discovery.V20 stereomicroscope and microphotographic images were taken by a Axiocam 208 colour digital camera attached to the stereomicroscope and enabled with the software Zeiss ZEN 3.3. The Left palp was removed, studied, and photographed by placing them in a cavity block filled with 70% ethanol. All measurements are in millimetres (mm). The species was identified based on Dippenaar-Schoeman & Van Harten (2007) and Jaffry *et al.* (2025). The examined specimen has been deposited in the reference collection (RRLC-ZC/SP-02) of the Department of Zoology, R. R. Lalan College, Bhuj-Kachchh, Gujarat, India.

Legs Measurements are in the following form: leg I [femur, patella, tibia, metatarsus, tarsus]. Abbreviations used: ALE = anterior lateral eye, AME = anterior median eye, PLE = posterior lateral eye, PME = posterior median eye.

Taxonomy

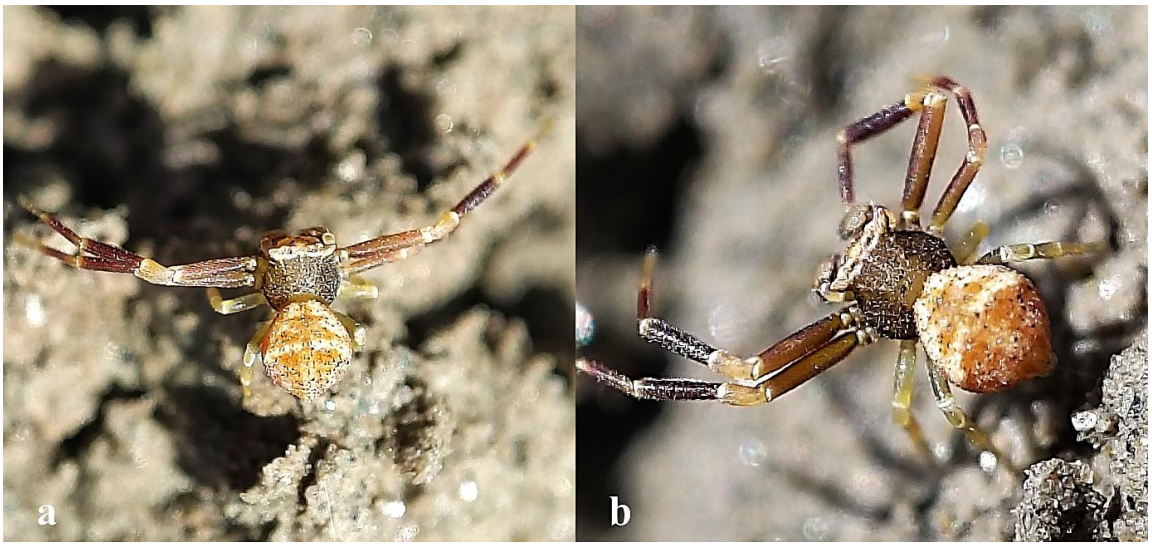
Family **Thomisidae** Sundevall, 1833
Genus ***Thomisus*** Walckenaer, 1805
Thomisus unidentatus Dippenaar-Schoeman & van Harten, 2007
(Figs. 1a-b, 2a-g)

Thomisus unidentatus Dippenaar-Schoeman & van Harten, 2007: 180, figs. 27-29 (♂♀).
Thomisus unidentatus Seyyar, Demir & Najim, 2016: 221, figs. 2a-f (♂♀).
Thomisus unidentatus Kiany *et al.*, 2017: 4, figs. 8a-e (♂♀).
Thomisus unidentatus Diksha *et al.*, 2018: 97, figs. 1-8 (♂).
Thomisus unidentatus Jaffry, Butt & Zahra, 2025: 2085, figs. 10A-F (♂).

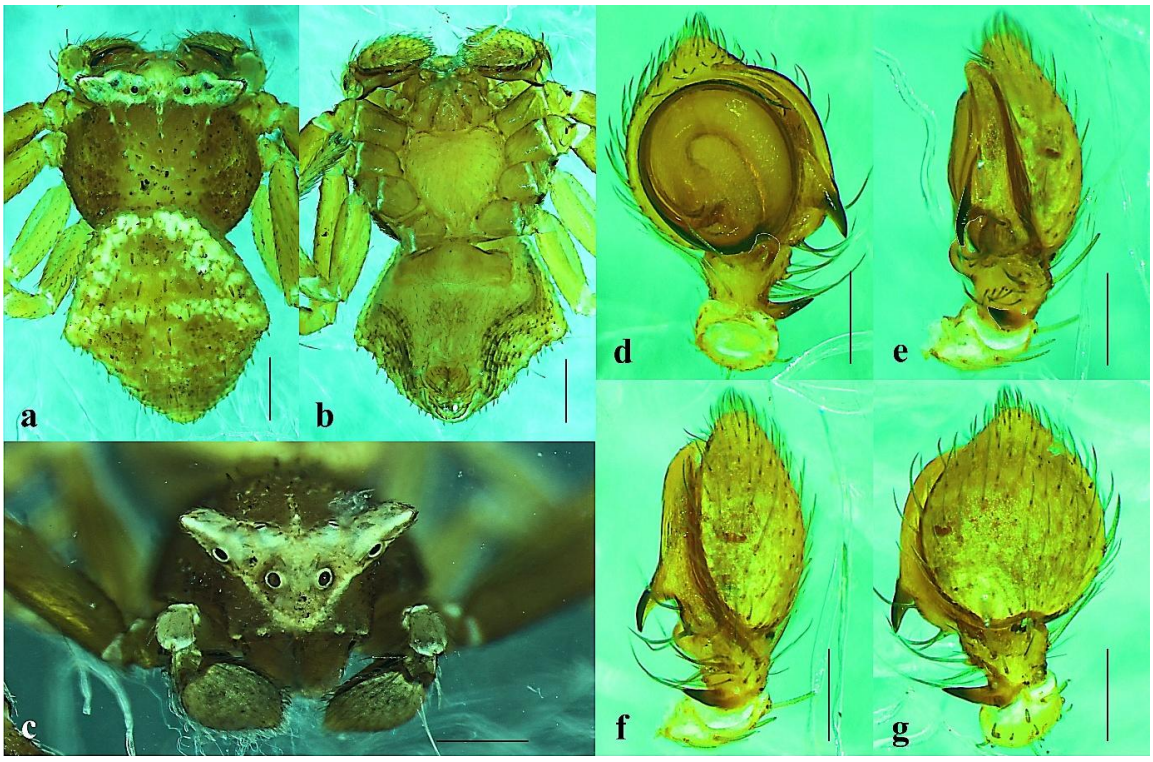
Material examined: 1♂ (RRLC-ZC/SP-02) near Jarpara village, Kachchh district, Gujarat, India, 22°46'50.48"N, 69°36'30.1"E, 20 m a.s.l., 25.04.2025, collected by S. Parmar, from mangrove habitat.

Diagnosis: the species can be easily distinguished from congeners by following characters: Male left palp with long and slender embolus with pointed tip, originating from lower part of tegulum (Fig. 2d). Tegular median apophysis robust, pointed tip directed downward, arising from tegulum retrolaterally (Figs. 2d-g). Tibia with two apophyses, a straight and blunt basal tibial apophysis and a long, robust retrolateral tibial apophysis, broad at base with sharp tip, directed at 2 o'clock position (Figs. 2d-g).

Description: Male (Figs. 1a-b, 2a-g) Body length 3.02. Carapace length 1.45, width (at the middle) 1.49. Abdomen length 1.88, width (at the middle) 1.78. Eye diameters and inter-distances: AME 0.07, ALE 0.07, PME 0.06, PLE 0.06, AME-AME 0.16, AME-ALE 0.15, PME-PME 0.26, AME-PME 0.18, PME-PLE 0.19, ALE-PME 0.16. Legs Measurements: leg I 4.08 [1.31, 0.49, 0.90, 0.79, 0.59], leg II 4.08 [1.31, 0.49, 0.90, 0.79, 0.59], leg III 2.43 [0.70, 0.41, 0.51, 0.51, 0.30], leg IV 2.53 [0.80, 0.41, 0.51, 0.51, 0.30]. Leg formula: 1243. Carapace dark brown laterally and paler medially, cephalic area narrowed in front with slivery spectacular protuberance, integument covered with numerous tubercles each bearing a seta. Sternum and labium yellowish in colour.



Figs. 1a-b. *Thomisus unidentatus* Dippenaar-Schoeman & van Harten, 2007 collected from Kachchh mangroves. Live photographs of male habitus, dorsal view.



Figs. 2a-g. *Thomisus unidentatus* Dippenaar-Schoeman & van Harten, 2007, ♂ (RRLC-ZC/SP-02). a-c. Habitus. a. dorsal view. b. ventral view. c. frontal view. d-g. left male palp. d. ventral view. e. retrolateral view. f. dorsolateral view. g. dorsal view.
(Scale bars: Figs. a, b, c = 0.5 mm; Figs. d, e, f, g = 0.2 mm).

Abdomen longer than wide, dorsally whitish yellow, covered with numerous irregular white spots anteriorly and laterally. Ventrally yellow in colour. Legs without annulations. Femur and patella of legs I and II light brown and pale respectively. Tibia and tarsus of legs I and II are dark brownish in colour. Legs III and IV are yellowish in colour. Pedipalp with long and slender embolus, pointed tip directed at 3 o'clock position,

originating from lower part of tegulum at 6 o'clock position (Fig. 2d). Tegular median apophysis robust, pointed tip directed downward, arising at 4 o'clock position from tegulum retrolaterally (Figs. 2d-g). Tibia with two apophyses, a straight and blunt basal tibial apophysis and a long, robust retrolateral tibial apophysis, broad at base with sharp tip, directed at 2 o'clock position (Figs. 2d-g).

World Distribution: Yemen, Iraq, Iran, Pakistan, India (World Spider Catalog, 2025).
Distribution in India: Delhi, Uttar Pradesh (Diksha *et al.*, 2018) and Gujarat (New record) (Fig. 3).

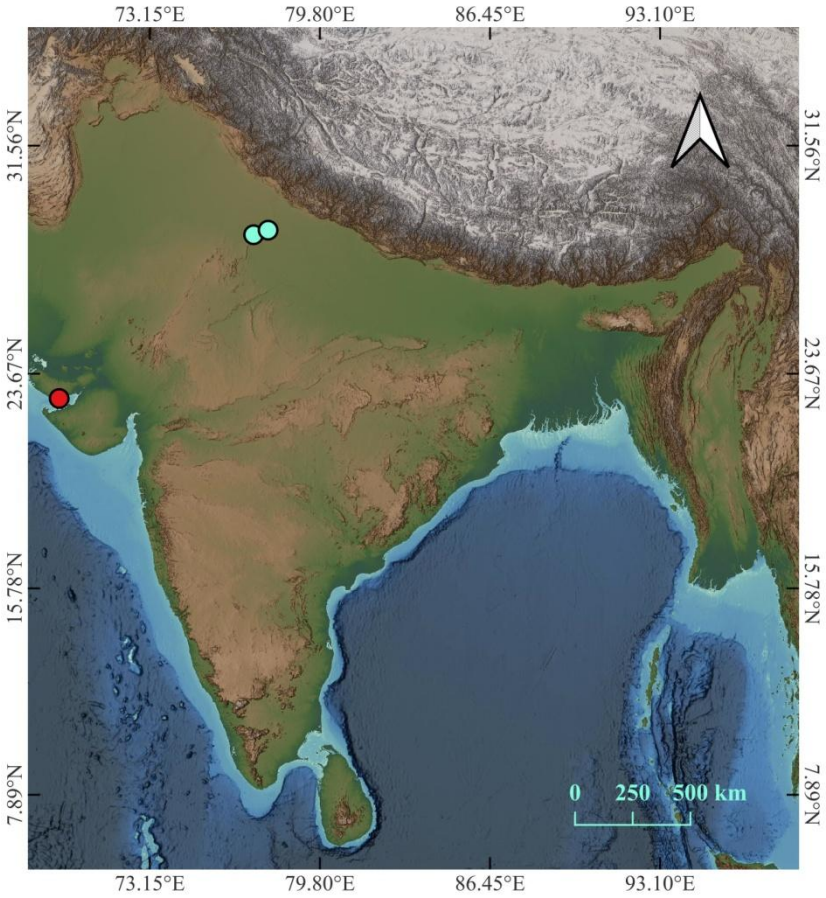


Fig. 3. Distribution map of *Thomisus unidentatus* Dippenaar-Schoeman & van Harten, 2007 in India. Blue circle = previous record, red circle = new record.

Acknowledgments

Authors are thankful to UGC (University Grants Commission) for providing Junior Research fellowship (Award no. 231610067756) to SIP for the doctoral research; The Department of Earth and Environmental Sciences, KSKVK University for providing lab facilities under DST-FIST [Pr. No. SR/FST/ES-I/2018/29(C)]; Mr. Karan Gadhvi and Mr. Ketan Yogi for the support. Also, grateful to Mr. Vivek Chauhan for technical support in image processing.

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Micaria atropatene Zamani & Marusik, 2021 is a new record of Turkish spider fauna (Araneae: Gnaphosidae)

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Abstract

The ground spider species *Micaria atropatene* Zamani & Marusik, 2021 is recorded for the first time from Türkiye. Its general habitus and genitalia are illustrated. Description and collecting data of this species are also given.

Keywords: Araneae, Gnaphosidae, *Micaria atropatene*, new record, Türkiye.

Introduction

Gnaphosidae is now the largest spider family in Türkiye. The known Turkish gnaphosid fauna includes 169 species and 35 genera (Demir & Seyyar, 2017; Seyyar & Demir, 2018; Seyyar, 2022). We collected only two male specimens of *Micaria atropatene* Zamani & Marusik, 2021 from Türkiye. The aim of this paper is to present this species as a new record for the Turkish gnaphosid fauna.

Material and Methods

In this study, only two male specimens were collected from İtulumaz Mountain in Niğde Province from Central Anatolia Region in Türkiye (Fig. 1). Examined specimens were preserved in 70% ethanol and deposited in the Niğde Ömer Halisdemir University Arachnology Museum (NÖHUAM). In the identification, Zamani & Marusik (2021) and Zamani *et al.* (2025) were consulted. The identification was made by means of a SZX61 Olympus stereomicroscope.

Fig 1. Collecting locality (Niğde province) of *Micaria atropatene* Zamani & Marusik, 2021 in Türkiye.

Results

Micaria atropatene Zamani & Marusik, 2021 (Figs. 2-3)

Description: See Zamani & Marusik (2021).

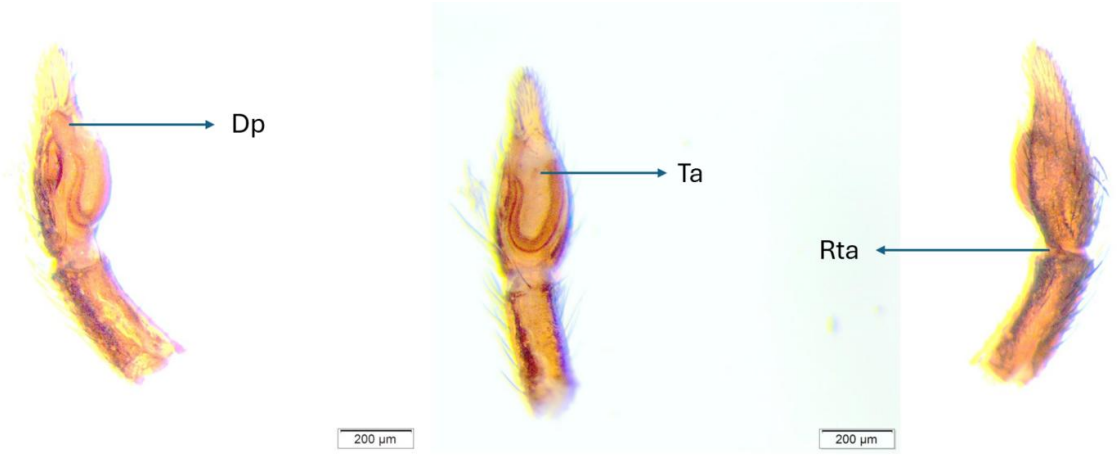
Taxonomic references

Micaria atropatene Zamani & Marusik, 2021
Micaria atropatene Zamani *et al.*, 2025

Collected specimens: Niğde Province, İtulumaz Mountain (37º55'42.08"N, 34º44'22.30"E, 2042 m,), 16.III.2025 (2♂♂), *Leg.* Hakan Demir.

Distribution: North-western Iran (Zamani & Marusik, 2021), Azerbaijan (Zamani *et al.*, 2025), and Türkiye (the present paper).

Fig. 2. Male habitus of *Micaria atropatene* Zamani & Marusik, 2021.



A B C

Fig. 3. Male palp of *Micaria atropatene* Zamani & Marusik, 2021. A. prolateral view. B. ventral view. C. retrolateral view. (Abbreviations: Dp = distal tegular process, Rta = retrolateral tibial apophysis, Ta = tegular apophysis)

Acknowledgment

The authors acknowledge the Niğde Ömer Halisdemir University Scientific Project Unit (Project no: FMT 2023/12-LÜTEP) for its financial support. This study is part of the master thesis of the second author.

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Serket (2025) vol. 21(1): 105-109.

New, revalidated and synonymized scorpion taxa (Arachnida: Scorpiones) described in the journal "*SERKET*" in 1992-2025

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Introduction

In 1992-2025, Serket published descriptions of 38 new species, 1 new subgenus and 1 new subspecies of scorpions. The type specimens of new species described in the journal originate from 27 countries: Burkina Faso, Cameroon, Central African Republic, Chad, China, Egypt, Ghana, Iran, Iraq, Jordan, Kenya, Kuwait, Libya, Madagascar, Malaysia, Mali, Mauritania, Mozambique, Niger, Nigeria, Pakistan, Saudi Arabia, Somalia, Sudan, Syria, Vietnam, and Western Sahara.

List of new taxa

Buthidae

- *Androctonus agrab* Ythier & Lourenço, 2022a (Western Sahara)
- *Androctonus cacahuati* Lourenço, 2023a (Cameroon)
- *Androctonus minaeus* Abu Afifeh, Al-Saraireh & El-Hennawy, 2025 (Jordan)
- *Androctonus santi* Lourenço, 2015 (Niger)
- *Androctonus tibesti* Lourenço & El-Hannawy, 2022 (Libya)
- *Butheoloides cimrmani* Kovařík, 2003a (Ghana)
- *Buthus centroafricanus* Lourenço, 2016 (Central African Republic)
- *Buthus orientalis* Lourenço & Simon, 2012 (Egypt)
- *Buthus turkana* Ythier & Lourenço, 2022b (Kenya)
- *Compsobuthus becvari* Kovařík, 2003b (Pakistan)
- *Compsobuthus henrii* Ythier & Ullrich, 2025 (Saudi Arabia)

- *Compsobuthus jakesi* Kovařík, 2003b (Iraq)
- *Compsobuthus kabateki* Kovařík, 2003b (Egypt)
- *Compsobuthus kafkai* Kovařík, 2003b (Iran)
- *Compsobuthus kaftani* Kovařík, 2003b (Iran)
- *Compsobuthus plutenkoi* Kovařík, 2003b (Iran)
- *Compsobuthus seicherti* Kovařík, 2003b (Sudan)
- *Compsobuthus sobotniki* Kovařík, 2003b (Iran)
- *Hottentotta akbarii* Yağmur, Moradi, Tabatabaei & Jafari, 2022 (Iran)
- *Leiurus aegyptiacus* Lourenço & El-Hennawy, 2021 (Egypt)
- *Leiurus kuwaiti* Lourenço, 2020b (Kuwait)
- *Leiurus (Iraquioleiurus)* Lourenço, 2022 (Iraq)
- *Leiurus (Iraquioleiurus) maculatus* Lourenço, 2022 (Iraq)
- *Leiurus nigerianus* Lourenço, 2021 (Nigeria)
- *Leiurus sahelicus* Lourenço, El-Hennawy & Ythier, 2025 (Niger)
- *Leiurus tamajeq* Lourenço & Ythier, 2024a (Mali)
- *Mesobuthus* (*Aegaeobuthus*?) *nigrocinctus bishri* Lourenço, 2020a (Syria)
- *Microbuthus saharicus* Lourenço, 2023b (Mauritania)
- *Microcharmus aridus* Lourenço & Wilmé, 2025 (Madagascar)
- *Orthochirus arenicola* Lourenço & Ythier, 2021 (Somalia)
- *Trypanothacus azraqensis* Al-Saraireh, Abu Afifeh, Aloufi, Amr & Lourenço, 2021 (Jordan)

Chaerilidae

- *Chaerilus petrzelkai* Kovařík, 2000b (Vietnam)
- *Chaerilus tichyi* Kovařík, 2000b (Malaysia)
- *Chaerilus tryznai* Kovařík, 2000b (China, Tibet)

Hormuridae

- *Opisthacanthus* (*Nepabellus*) *mossambicensis* Lourenço & Ythier, 2024b (Mozambique)

Scorpionidae

- *Pandinus (Pandinops) pococki* Kovařík, 2000a (Somalia)
- *Pandinus (Pandinurus) vachoni* Rossi, 2014 (Chad)
- *Pandinus sahelicus* Ythier & Audibert, 2023 (Burkina Faso)
- *Scorpio niger* Lourenço & Cloudsley-Thompson, 2012 (Niger)

A chronological list of issues, 1992-2025 with descriptions of new taxa and systematic modifications

1992 EL-HENNAWY H.K. A catalogue of the scorpions described from the Arab countries (1758-1990) (Arachnida: Scorpionida). *Serke*t, 2(4): 95-153.

- *Prionurus eburneus = Androctonus hoggarensis.*
- *Buthacus arenicola fuscata = Buthacus arenicola.*

2000a KOVAŘÍK F. *Pandinus (Pandinops) pococki* sp. n. from Somalia, and *Pandinus pugilator*, a junior synonym of *Pandinus (Pandinops) bellicosus* comb. n. (Scorpiones, Scorpionidae). *Serket*, 7(1): 1-7.

- *Pandinus (Pandinops) pococki* sp. n.

- *Pandinus pugilator = Pandinus (Pandinops) bellicosus*.

2000b KOVAŘÍK F. Revision of family Chaerilidae (Scorpiones), with descriptions of three new species. *Serket*, 7(2): 38-77.

- *Chaerilus petrzelkai* sp. n., *Chaerilus tichyi* sp. n., *Chaerilus tryznai* sp. n.
- *Chaerilus anthracinus, Chaerilus anthracinus rufescens, Chaerilus granosus, Chaerilus granifrons, Chaerilus hirsti = Chaerilus truncatus.*

2002 KOVAŘÍK F. A checklist of scorpions (Arachnida) in the collection of the Forschungsinstitut und Naturmuseum Senckenberg, Francfurt am Main, Germany. *Serket*, 8(1): 1-23.

- *Heterometrus petersi luzonensis = Heterometrus cyaneus.*

2003a KOVAŘÍK F. *Butheoloides cimrmani* sp. n. from Ghana (Scorpiones, Buthidae). *Serket*, 8(3): 125-127.

- *Butheoloides cimrmani* sp. n.

2003b KOVAŘÍK F. Eight new species of *Compsobuthus* Vachon, 1949 from Africa and Asia (Scorpiones, Buthidae). *Serket*, 8(3): 87-112.

- *Compsobuthus becvari* sp. n., *Compsobuthus jakesi* sp. n., *Compsobuthus kabateki* sp. n., *Compsobuthus kafkai* sp. n., *Compsobuthus kaftani* sp. n., *Compsobuthus plutenkoi* sp. n., *Compsobuthus seicherti* sp. n., *Compsobuthus sobotniki* sp. n.

2006 KARATAŞ Ay. Distribution and systematic status of *Euscorpius italicus* (Herbst, 1800) (Scorpiones, Euscorpiidae) in Turkey. *Serket*, 10(1): 9-17.

- *Euscorpius italicus awhasicus* subspecies invalid.

2012 LOURENÇO W.R. & CLOUDSLEY-THOMPSON J.L. About the enigmatic presence of the genus *Scorpio* Linnaeus, 1758 in Congo with the a new species from Niger (Scorpiones, Scorpionidae). *Serket*, 13(1/2): 1-7.

- *Scorpio niger* sp. n.

2012 LOURENÇO W.R. & SIMON E. Confirmation of a new species of *Buthus* Leach, 1815 from Alexandria, Egypt (Scorpiones : Buthidae). *Serket*, 13(1/2): 8-15.

- *Buthus orientalis* sp. n.

2014 ROSSI A. The fragmented peri-Saharan distribution of the subgenus *Pandinurus* Fet, 1997 with the description of a new species from Chad (Scorpiones, Scorpionidae, *Pandinus*). *Serket*, 14(1): 6-14.

- *Pandinus (Pandinurus) vachoni* sp. n.

2015 LOURENÇO W.R. A new species of *Androctonus* Ehrenberg, 1828 from the Aïr Massif in Niger (Scorpiones: Buthidae). *Serket*, 14(4): 167-175.

- *Androctonus santi* sp. n.

2016 LOURENÇO W.R. A new species of the genus *Buthus* Leach, 1815 (Scorpiones: Buthidae) from dry forest formations in Central African Republic. *Serket*, 15(2): 71-79.

- *Buthus centroafricanus* sp.n.

2020a LOURENÇO W.R. A possible relict population of *Mesobuthus (Aegaeobuthus*?) *nigrocinctus* (Ehrenberg, 1828) in the Bishri Mountains of Syria (Scorpiones: Buthidae). *Serket*, 17(2): 77-86.

- *Aegaeobuthus nigrocinctus bishri* ssp.n.

2020b LOURENÇO W.R. First record and description of a new species of *Leiurus* Ehrenberg from Kuwait (Scorpiones: Buthidae). *Serket*, 17(2): 143-149.

- *Leiurus kuwaiti* sp. n.

2021 LOURENÇO W.R. & EL-HENNAWY H.K. New considerations on the *Leiurus* Ehrenberg (Scorpiones: Buthidae) distributed in Africa and description of a particular species from Egypt. *Serket*, 17(4): 325-334.

- *Leiurus aegyptiacus* sp. n.

2021 LOURENÇO W.R. & YTHIER E. A particular new species of *Orthochirus* Karsch, 1891 from Somalia (Scorpiones: Buthidae). *Serket*, 17(4): 335-349.

- *Orthochirus arenicola* sp. n.
- *Orthochirus aristidis* is revalidated.
- *Orthochiroides = Orthochirus.*
- *Orthochiroides insularis, Orthochiroides socotrensis, Orthochiroides vachoni >> Orthochirus.*

2021 LOURENÇO W.R. A new species of *Leiurus* Ehrenberg (Scorpiones: Buthidae) from Nigeria, with extension of the distribution range of the genus to the Southwestern portion of the African continent. *Serket*, 18(1): 1-10.

- *Leiurus nigerianus* sp. n.

2021 AL-SARAIREH M., ABU AFIFEH B., ALOUFI A., AMR Z.S. & LOURENÇO W.R. First record of the genus *Trypanothacus* Lowe, Kovařík, Stockmann & St'ahlavsky, 2019 in Jordan and description of a new species (Scorpiones: Buthidae). *Serket*, 18(1): 11-21.

- *Trypanothacus azraqensis* sp. n.

2022a YTHIER E. & LOURENÇO W.R. A new species of *Androctonus* Ehrenberg, 1828 from Western Sahara (Scorpiones: Buthidae). *Serket*, 18(3): 239-251.

- *Androctonus agrab* sp. n.
- *Androctonus mauritanicus bourdoni > Androctonus bourdoni*

2022 YAĞMUR E.A., MORADI M., TABATABAEI M. & JAFARI N. Contributions to the scorpion fauna of Iran. Part II. *Hottentotta akbarii* sp. nov. From the Fars Province (Scorpiones: Buthidae). *Serket*, 18(3): 252-262.

- *Hottentotta akbarii* sp. n.

2022 LOURENÇO W.R. A new subgenus and species of *Leiurus* Ehrenberg, 1828 from Iraq (Scorpiones: Buthidae). *Serket*, 18(4): 421-427.

- *Leiurus (Iraquioleiurus)* subgen. n.
- *Leiurus (Iraquioleiurus) maculatus* sp. n.

2022 LOURENÇO W.R. & EL-HENNAWY H.K. A new species of *Androctonus* Ehrenberg, 1828 from the North East portion of the Tibesti Massif in Libya. *Serket*, 18(4): 428-440.

- *Androctonus tibesti* sp. n.

2022b YTHIER E. & LOURENÇO W.R. First record of the genus *Buthus* Leach, 1815 from Kenya (Scorpiones: Buthidae) and description of a new species. *Serket*, 19(1): 1-6.

- *Buthus turkana* sp. n.

2023a LOURENÇO W.R. A new species of *Androctonus* Ehrenberg, 1828 from the Northern savannas of Cameroon (Scorpiones: Buthidae). *Serket*, 19(2): 111-120.

- *Androctonus cacahuati* sp. n.

2023 YTHIER E. & AUDIBERT C. A new species of *Pandinus* Thorell, 1876 from the Sahelian wooded steppes of Burkina Faso (Scorpiones: Scorpionidae). *Serket*, 19(4): 398-411.

- *Pandinus sahelicus* sp. n.

2023b LOURENÇO W.R. The remarkable micro-scorpion genus *Microbuthus* Kraepelin, 1898 in North Africa; description of a new species with comments on its biogeography and ecology (Scorpiones: Buthidae). *Serket*, 20(1): 1-10.

- *Microbuthus saharicus* sp. n.

2024a LOURENÇO W.R. & YTHIER E. A new African species of the genus *Leiurus* Ehrenberg, 1828 from Mali (Scorpiones: Buthidae). *Serket*, 20(2): 58-67.

- *Leiurus tamajeq* sp. n.

2024b LOURENÇO W.R. & YTHIER E. A new contribution to the genus *Opisthacanthus* Peters, 1861 and in particular to the African species of the subgenus *Nepabellus* Francke, 1974 with the description of a new species from Mozambique (Scorpiones: Hormuridae). *Serket*, 20(3): 205-214.

- *Opisthacanthus mossambicensis* sp. n.

2025 LOURENÇO W.R. & WILMÉ L. A new species of *Microcharmus* Lourenço, 1995 (Scorpiones: Microcharmidae) from extremely dry areas of Central-West Madagascar. *Serket*, 20(4): 373-382.

- *Microcharmus aridus* sp. n.

2025 YTHIER E. & ULLRICH A. A new species of *Compsobuthus* Vachon, 1949 from Saudi Arabia (Scorpiones: Buthidae). *Serket*, 20(4): 383-392.

- *Compsobuthus henrii* sp. n.

2025 LOURENÇO W.R., EL-HENNAWY H.K. & YTHIER E. A further new species of *Leiurus* Ehrenberg, 1828 (Scorpiones: Buthidae) from the South of Niger and confirmation of the extension of the distribution range of the genus to the Southern zones of the Sahara Desert. *Serket*, 21(1): 1-11.

- *Leiurus sahelicus* sp. n.
- *Leiurus aegyptiacus* is revalidated.

2025 ABU AFIFEH B., AL-SARAIREH M. & EL-HENNAWY H.K. A new *Androctonus* Ehrenberg, 1828 species from southern Jordan with implications for regional taxonomy and distribution (Scorpiones: Buthidae). *Serket*, 21(1): 12-32.

- *Androctonus minaeus* sp. n.

Serket (2025) vol. 21(1): 110-117.

Ant-mimicking jumping spiders of genus *Myrmarachne* of Bangladesh (Araneae: Salticidae: Myrmarachninae)

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Abstract

Present paper contains taxonomic account of some ant-mimicking jumping spiders of genus *Myrmarachne* MacLeay from Khulna, Bangladesh. Two species are recorded in this study of which *M. nonigopali* sp. n. is identified as new to science and another one *M. melanocephala* MacLeay, 1839 is a new locality record for the area of the present study. Brief generic diagnosis together with description, distribution, and key to the species are included.

Keywords: Ant-mimicking jumping spiders, Araneae, Salticidae, Myrmarachninae, *Myrmarachne*, Bangladesh.

Introduction

Jumping spiders of the genus *Myrmarachne* MacLeay, 1839 are attracting great interests of the arachnologists because of their peculiar ant-like appearance and mimicry. They are commonly found in the gardens and forests on the plant leaves, fences, body surface of trees and nests of red-ants. Genus *Myrmarachne* is widespread worldwide and the majority of which are oriental with preference to warm climate. The genus at present is composed of 191 valid species in the world fauna (World Spider Catalog, 2025) of which 29 species in the Indian Sub-continent (Narayan, 1915; Tikader, 1973; Bradoo, 1980; Prószyński, 1992; Sadana & Gupta, 1998; Keswani *et al*., 2012) and 130 species recorded in South and Southeast Asia (Yaginuma, 1986; Chen & Zhang, 1991; Barrion & Litsinger, 1995; Xiao, 2002; Yamasaki, 2010; Yamasaki & Ahmad, 2013; Yamasaki & Edwards, 2013; Peng, 2020) but only 6 (six) species are recorded in Bangladesh (Okuma

et al., 1993; Biswas, 2009, 2019; Biswas & Raychaudhuri, 2017, 2018a & 2018b). Present paper contains description of two species: *Myrmarachne nonigopali* sp. n. and *M. melanocephala* MacLeay, 1839 from Khulna, Southwest Bangladesh.

Material and Methods

Collecting and Preservation: The specimens were collected from Khulna, southern part of Bangladesh by hand vials and by jerking the branches of shrubs on an inverted umbrella placed underneath the plants. After sorting, the specimens were preserved primarily in 70% ethanol for identification. After identification, each specimen was preserved separately into Audmans' Preservatives following Lincoln & Sheals (1985). The preserved specimens are currently in the collection of the Department of Zoology, Khulna Governmenmt Womens' College, Khulna, Bangladesh and will be deposited in the Museum of the Department of Zoology, University of Dhaka, Bangladesh, in due course of time.

Identification and Study: Identification references consulted were: Narayan (1915), Tikader (1973, 1987), Wanless (1978), Prószyński (1992), Okuma *et al.* (1993), Barrion & Litsinger (1995), Fuhn & Gherasim (1995), Biswas (2009), Peng (2020), Yamasaki (2010), Yamasaki & Ahmad (2013), Yamasaki & Edwards (2013), Caleb (2016), and Żabka (1985).

After identification, necessary body-parts of the specimens (viz. – chelicerae, pedipalps, maxillae, labium etc.) are dissected out and illustrated under stereo-zoom binocular microscope. Female genitalia (Epigynum) is dissected out and cleared in 10% KOH for 3-5 minutes boiling following Levi (1965) and Tikader (1987). All measurements are taken in millimetres (mm). Leg measurements are given as in the following sequences: femur, patella, tibia, metatarsus, tarsus and total length.

Results

Taxonomy

Family **Salticidae** Blackwall, 1841
Division **Pleurodentati** Simon, 1901
Subfamily **Myrmarachninae** Prószyński, 1971
Tribe **Myrmarachnini** Maddison, 2015
Genus ***Myrmarachne*** MacLeay, 1839
Type-species ***Myrmarachne melanocephala*** MacLeay, 1838

Diagnosis: Body long, narrow, ant-like, small to medium in size. Cephalothorax variable, usually constricted, hairy, with one or two pairs of trichobothria. Eyes brown, dissimilar, anterior row sub-contiguous or contiguous, recurved; middle row in between the anterolateral and posterolateral eyes; posterior row of eyes equal to or wider than anterior row; ocular trapezium roughly squarish. Chelicerae normal, long or in few short, with 4-7 teeth on inner and 5-8 teeth on outer margin; in male, strongly developed, elongate, more or less horizontal and with or without numerous teeth on the margins. Maxillae elongate, rarely with median keel. Sternum variable, usually elongate and pointed posteriorly. Legs usually long and slender; femora I sometimes dorsoventrally enlarged and laterally compressed; leg formula 4132, ventral spines present on leg I and II.

Abdomen variable, usually elongate, constricted in some. Epigyne comparatively simple and with distinct openings separated by poorly developed septum; spermathecae simple, looped or twisted, rarely coiled.

Biological note: Spiders of the genus *Myrmarachne* are commonly known as '*ant-like spiders*'. They are very common on the leaves and body surface of higher plants or surface of wall of the houses. Sometimes they are found in association with the red-ants (in their nests) and appear a good example of mimicry (batesian mimicry). They do not spin any web but during breeding, when they construct a tubular nest by folding or rolling the leaves of plants. They are good predators of the garden and forest pest insects.

Distribution: Oriental and sub-tropical regions of the world.

Key to the species of *Myrmarachne* of Bangladesh

1. Cephalothorax without complete transverse constriction; abdomen elongate, wide posteriorly and a little convex anteromedially; cheliceral outer margin with 4 teeth (Fig. 2b); maxillae wide medially; male palp as in Fig. (2f & g) .... ***Myrmarachne melanocephala*** MacLeay, 1839

-. Cephalothorax with complete transverse constriction; abdomen elongately oval and not convex anteromedially; cheliceral outer margin with 2 teeth (Fig. 1c & d); maxillae wide anteriorly; male palp as in Fig. (1g & h) ..... ***Myrmarachne nonigopali*** sp. n.

1. *Myrmarachne nonigopali* sp. n.
(Figs. 1a-h, 3a)

Material examined: Holotype: 1 male, collected from leaves of bushes, Daulatpur Agril. College garden, district Khulna. Paratypes: 2 males, collected from Dumuria, Khulna.

Type locality: Bangladesh: Daulatpur, district Khulna, Date: 12.IV.2007, Coll. V. Biswas and Dumuria, dist. Khulna, date: 15.VII.2008, Coll. V. Biswas. Types are at present in the collection of the Department of Zoology, Khulna Government Womens' College, Khulna and will be deposited to the Museum of the Department of Zoology, University of Dhaka, Bangladesh.

Description of the male (Fig. 1a)**:** Body long, small, ant-like in appearance, deep brown with blackish brown head. Legs light brown, long and slender. Total body length 6.00 mm. Carapace length 2.00 mm, width 0.90 mm, height 0.70 mm. Abdomen length 4.00 mm, width 1.10 mm and height 0.90 mm. Eye field length 0.60 mm; anterior width 0.45 mm and posterior width 0.40 mm.

Cephalothorax: Long, constricted with distinct thoracic 'hump' (Fig. 1a, b); brown in colour; cephalic region a little wider laterally. Eyes in 3 rows, each encircled with black patch; anterior row of eyes placed marginally, slightly recurved, eye-field with some silver spots; long, thin brown hairs on the dorsum and whitish hairs on lateral surface of carapace; posterior lateral eyes situated marginally on a tubercle. Thoracic part brownish, elongate, oval, medially wide and elevated (Fig. 1b). Chelicerae broad, brown, inner margin with 2 and outer margin with 3 teeth; fang short and pointed (Fig. 1c, d). Clypeus very low. Maxillae brownish, elongate, basally constricted and anterodorsally with a hump, anteriorly scopulate (Fig. 1e). Labium pot-like, brown, scopulate anteriorly (Fig. 1e). Sternum long, brownish, narrow, pointed posteriorly and with anterior depression

(Fig. 1f). Pedicel short, prominent, tube-like. Legs long and slender, with leg IV very long; trochanter light yellow, femur brown, other parts brown. Leg formula 4132 and the measurements (in mm) of different segments are shown in Table (1).

Table 1. Measurements (mm) of leg segments of *Myrmarachne nonigopali* sp. n. ♂.

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	0.80	0.20	0.50	0.50	0.30	2.30
II	0.70	0.20	0.30	0.30	0.20	1.70
III	0.80	0.20	0.40	0.30	0.30	2.00
IV	1.10	0.30	0.20	1.00	0.40	3.00

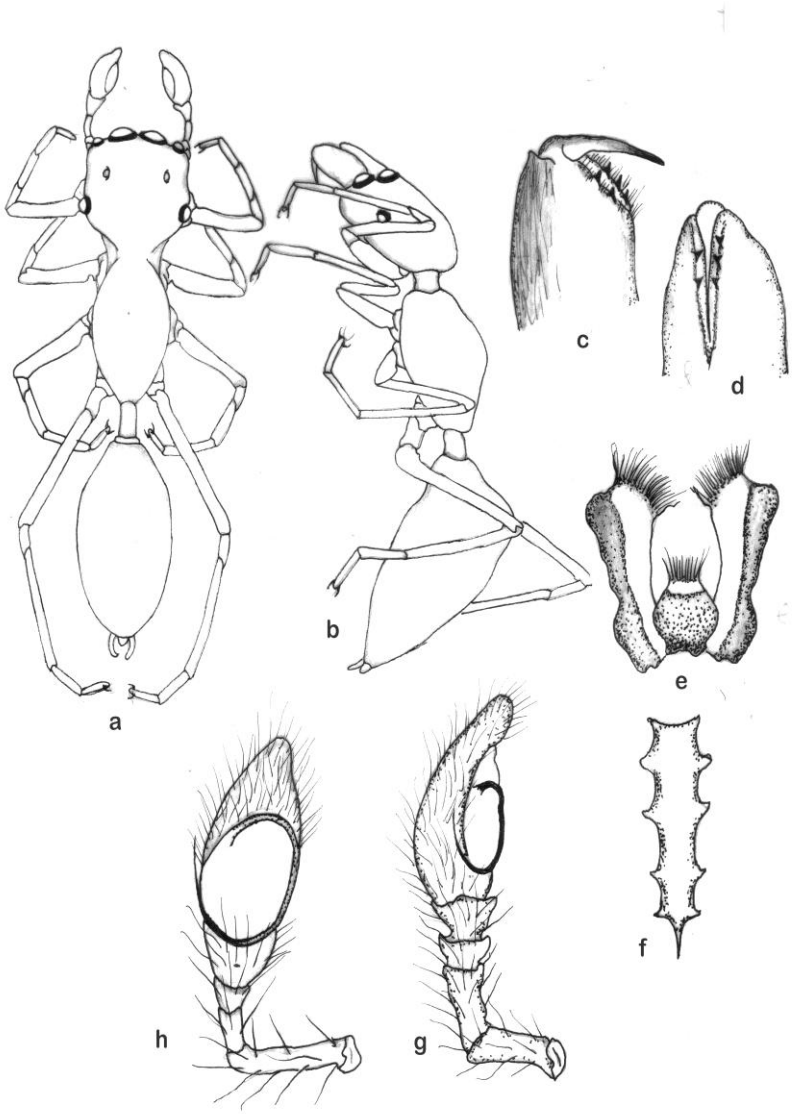

Fig. 1. *Myrmarachne nonigopali* sp. n. ♂. a-b. Habitus. a. dorsal view. b. lateral view. c-d. Chelicerae. c. lateral view. d. ventral view. e. Maxillae & labium. f. Sternum. g-h. Male palp. g. lateral view. h. ventral view.

Male pedipalp: brown, long. Bulbus rounded, tegulum swollen; embolous long and slender; sperm duct coiled (Fig. 1g, h).

Abdomen: long, cylindrical, brownish-black, narrowing posteriorly, dorsum with a hump. Lateral spinnerets long (Fig. 1a, b).

Female: Unknown.

Etymology: The species is named in honour to the memory of my beloved uncle Late Noni Gopal Biswas.

Diagnosis: The present species is closely related to *Myrmarachne melanocephala* MacLeay, 1839, but it can be distinguished from its other Indian congeners by the following characters: (1) Abdominal shape and colouration different. (2) Cheliceral fang short and without inner cusp and different numbers of marginal teeth (Fig. 1c, d). (3) Structure of maxillae, labium and sternum different and (4) Structure of male palp different (Fig. 1g, h) and different with other neighbours and known species from elsewhere (Tikasder, 1973; Żabka, 1985; Prószyński, 1992; Okuma *et al.*, 1993; Fuhn & Gherasim, 1995; Yamasaki & Ahmad, 2013; Yamasaki & Edwards, 2013; Biswas & Raychaudhuri, 2017, 2018a,b; Peng, 2020).

Therefore, this species, is described as new to science.

2. *Myrmarachne melanocephala* MacLeay, 1839
(Figs. 2a-g, 3b)

[For synonyms, see World Spider Catalog, 2025]

Material examined: 2 males, Daulatpur, District Khulna, 12.IV.2007, Coll. V. Biswas; 1 male & 2 females, Dumuria, District Khulna, 15.IV.2008, Coll. V. Biswas.

Description of male: Body long, blackish-brown, ant-like in appearance; abdomen anteriorly pale brown, posteriorly black. Legs long and slender, brownish. Total body length 8.40 mm. Carapace 4.25 mm long, 2.00 mm wide, height 1.20 mm; Abdomen 4.15 mm long, 1. 30 mm wide and height 1.10 mm. Eye field length 0.70 mm; anterior width 0.50 mm and posterior width 0.40 mm.

Cephalothorax: elongate, broad, longer than wide, medially constricted forming two lobes; cephalic region nearly round, a little raised. Eyes prominent, black, anterior row of eyes recurved, anteromedians nearly close and larger than the anterolaterals, posterior row of eyes straight, placed marginally. Chelicerae dark brown, very long, fang large, each of inner and outer margins with a series of small teeth (Fig. 2b). Maxillae and labium brown, longer than wide, anteriorly scopulate (Fig. 2c). Sternum very long, posteriorly narrow and pointed (Fig. 2d). Male palp long, sperm duct coiled; tibial apophysis long, spiny, prominent (Fig. 2f, g). Legs long and slender, clothed with hairs and spines; leg formula 4132 and the measurements (in mm) as shown in Table (2).

Table 2. Measurements (mm) of leg segments of *Myrmarachne melanocephala* MacLeay, 1839, ♂.

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	0.90	0.25	0.60	0.50	0.30	2.55
II	0.80	0.20	0.30	0.30	0.20	1.80
III	0.80	0.20	0.40	0.40	0.20	2.00
IV	1.20	0.30	1.30	0.90	0.40	4.10

Abdomen: Long, anteriorly narrowing and posteriorly wide; anteromedially constricted forming 2 lobes; posterior lobe black; anterior lobe raised; pedicel long and prominent.

Description of female: a little smaller than male, brown in colour. Body long, total length 7.10 mm. Legs long and slender, brownish. Abdomen long with a little median constriction. Eye field length 0.50 mm.

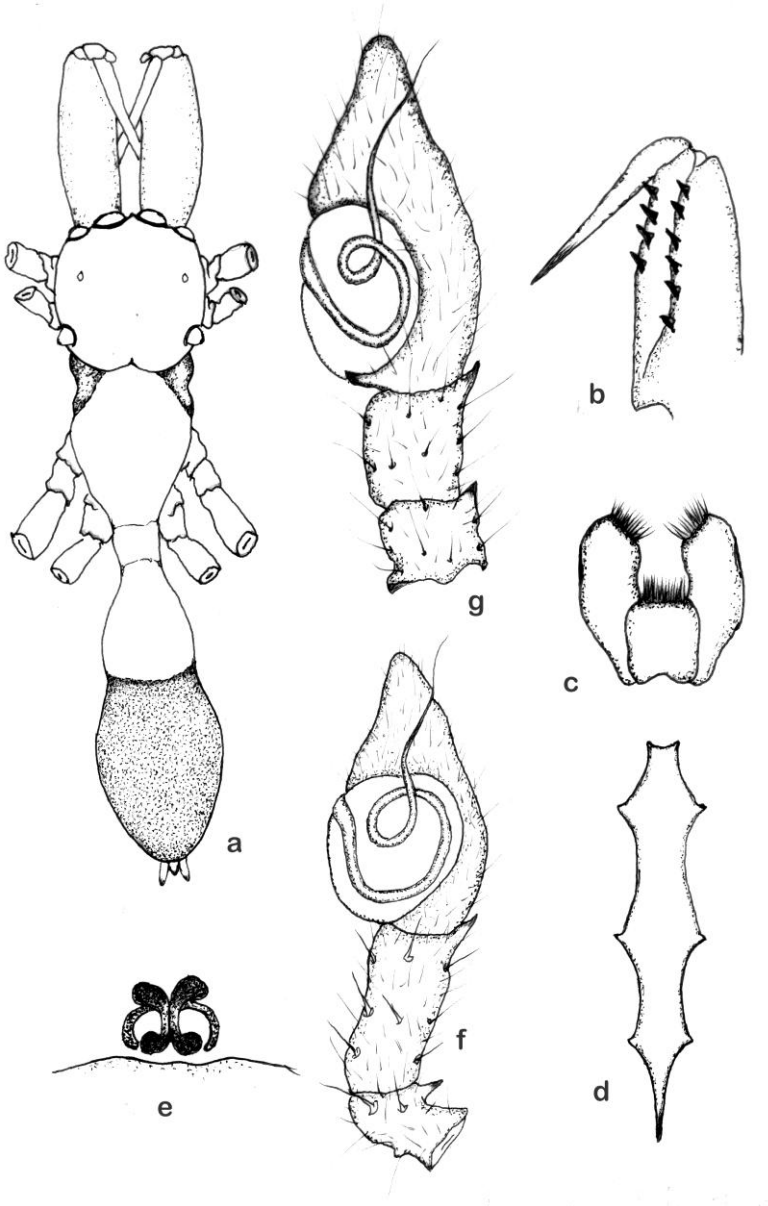

Fig 2. *Myrmarachne melanocephala* MacLeay, 1839 ♂. a. Habitus, dorsal view. b. Chelicerae, lateral view. c. Maxillae & labium. d. Sternum. e. Epigynum. f-g. Male palp. f. ventral view. g. latero-ventral view.

Cephalothorax: elongate, broad, longer than wide, medially a little constricted. Eyes prominent, black, anterior row recurved, anteromedians nearly close, posterior row nearly straight. Chelicerae brown, short, fang also short, margins with few teeth. Maxillae, labium and sternum are as in male but smaller in size.

Fig. 3. a. *Myrmarachne nonigopali* sp. n., ♂, Habitus. b. *Myrmarachne melanocephala* MacLeay, 1839, ♂, Habitus.

Abdomen: Long, anteriorly narrowed, with a little median constriction. Epigyne, vulva bulb-like, curved (Fig. 2e). Spinnerets small, a little curved.

Distribution: Bangladesh: Khulna; India (Prószyński 1990; Tikader, 1973).

Acknowledgments

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Thomisus bidentatus Kulczyński, 1901 in Jordan (Araneae: Thomisidae), with updated list of the known records of spiders from Jordan

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Abstract

Thomisus bidentatus Kulczyński, 1901 of family Thomisidae is recorded from Jordan for the first time. One adult male specimen of this species was collected in September 2016 in a house garden in Amman, Jordan. Its illustrations and measurements are presented.

An updated list of the known records of spiders from Jordan is presented. The list includes 19 families, 34 genera, and 40 species of spiders in Jordan.

Keywords: Araneae, Thomisidae, *Thomisus bidentatus*, Jordan.

Introduction

Family Thomisidae Sundevall, 1833 is a diverse and widespread large family of 171 genera and 2195 species (World Spider Catalog, 2025).

Diagnostic and descriptive characters of family Thomisidae "Crab spiders"

Diagnostic characters

Small to large araneomorph spiders (2-23 mm); two tarsal claws; ecribellate; entelegyne; eight eyes; legs laterigrade with I and II usually longer than III and IV (except Bominae); lateral eyes usually on tubercles; morphologically a very diverse group (Jocqué & Dippenaar-Schoeman, 2006).

Descriptive characters

Colour: variable, from brightly coloured (pink, green, yellow) to dark brown or grey and mottled; abdomen frequently patterned. Carapace: variable; varies from

semicircular, ovoid to elongated; usually with simple, erect setae; some species with strong protuberances or eye tubercles. Sternum: heart-shaped. Eyes: eight; in two rows (4:4); lateral eyes usually on tubercles, which vary from rounded to distinct; lateral eyes usually larger than other eyes, Chelicerae: cheliceral teeth absent except in Stephanopinae; cusps or small denticles sometimes on promargin. Mouthparts: endites and labium usually longer than wide; greatly elongated and pointed in Strophiinae. Legs: with two claws; laterigrade; legs I and II longer than III and IV (except Bominae); anterior tarsi without scopulae; claw tufts absent or, if present, consisting of spatulate setae; anterior legs frequently with series of strong spines on tibiae and metatarsi. Abdomen: variable in shape, from round to ovoid or elongated, extending caudally beyond spinnerets: usually with scattered simple setae. Spinnerets: anterior spinnerets short, conical and narrowly separated; colulus present. Respiratory system: two booklungs; tracheal spiracle close to spinnerets. Genitalia: entelegyne; epigyne variable, usually with hook; guide pockets or atrium bordered; tibia of male palp with ventral and retrolateral apophyses; tegulum disc-like; embolus variable (Jocqué & Dippenaar-Schoeman, 2006).

Genus *Thomisus* Walckenaer, 1805 includes 137 species and 5 subspecies, worldwide distributed, mainly in Africa, Asia, and Europe.

Thomisus spiders usually live in vegetation, mainly inside flower corollas. Their colour, at least to the human eye, often matches precisely the colour of the flower where they wait, with their legs spread widely, for prey (Levy, 1973). For description of the genus see Levy (1973: 124; 1985: 35) and for its diagnosis see Dippenaar-Schoeman & Van Harten (2007: 171).

Family **Thomisidae** Sundevall, 1833
Genus ***Thomisus*** Walckenaer, 1805
Thomisus bidentatus Kulczyński, 1901
Figs. 1-5.

Taxonomic references
Thomisus bidentatus Kulczyński, 1901: 3, 33-38, pl. 2, f. 32-34 (D♂♀).
Thomisus bidentatus Levy, 1973: 129-131, f. 47-50 (♂♀).
Thomisus bidentatus Levy, 1985: 41-42, f. 51-54 (♂♀).
Thomisus bidentatus Dippenaar-Schoeman, 1989: 22-23, f. 1 (♂).
Thomisus bidentatus Dippenaar-Schoeman & Van Harten, 2007: 173-175, f. 7-9 (♂♀).

World Distribution: Egypt (Sinai: St. Catherine's Monastery [Qaser 'Abbas Pasha, Wadi Zawatin], and Nuweiba), Eritrea, Ethiopia, Guinea, Ivory Coast, Palestine (West Bank: Wadi Qelt), Saudi Arabia, Upper Volta, Yemen.

For description and distribution of *Thomisus bidentatus* Kulczyński, 1901 see Kulczyński (1901), Levy (1973 & 1985), Dippenaar-Schoeman (1989), and Dippenaar-Schoeman & Van Harten (2007).

Material examined. Jordan, 1♂, Abu Nseir, north of Amman (32°03'17.4"N, 35°52'57.3"E elev. 1026 m), 9 September 2016, 10 AM, in a house garden [ACE.2016.09.09.AR.001.JOR] [Deposited in the Arachnid Collection of Egypt (ACE)].

Figs. 1-5. Male *Thomisus bidentatus* Kulczyński, 1901, from Amman. 1-2. Habitus. 1. dorsal view. 2. frontal view. 3-5. Male pedipalp. 3. prolateral view. 4. ventral view. 5. retrolateral view.

Body measurements, in millimetres (mm): Total length 1.84; Carapace length 1.10; Carapace width 1.08; Abdomen length 0.90.

Male habitus and carapace, dorsal and frontal views (Figs. 1-2).

Male palp (Figs. 3-5): The male of *T. bidentatus* can be distinguished from other *Thomisus* species by the large spines on the patella of its palp (Dippenaar-Schoeman, 1989). Palp with two large sharply pointed retrolateral apophyses on patella, sometimes smaller apophysis present dorsally; tibia with long and broad retrolateral tibial apophysis and small hook-shaped ventral tibial apophysis; embolus short and thick originating dorso-laterally (Dippenaar-Schoeman & Van Harten, 2007).

Spider species of Jordan according to known records

The following list of Jordanian spiders comprises the list of 2020 (El-Hennawy, 2020) [13 Families, 24 genera, 28 species] updated by El-Hennawy (2025) in addition to this new record of *Thomisus bidentatus* (*) to raise the recorded taxa to: 19 Families, 34 genera, and 40 species.

Family **Agelenidae** C.L. Koch, 1837

Lycosoides coarctata (Dufour, 1831)

Family **Araneidae** Clerck, 1757

Argiope lobata (Pallas, 1772)

Family **Dysderidae** C.L. Koch, 1837
Dysdera lata Reuss, 1834

Family **Eresidae** C.L. Koch, 1845
Stegodyphus lineatus (Latreille, 1817)
Stegodyphus pacificus Pocock, 1900

Family **Gnaphosidae** Pocock, 1898
Haplodrassus mediterraneus Levy, 2004
Pterotricha dalmasi Fage, 1929
Zelotes scrutatus (O. Pickard-Cambridge, 1872)

Family **Linyphiidae** Blackwall, 1859
Alioranus pastoralis (O. Pickard-Cambridge, 1872)

Family **Liocranidae** Simon, 1897
Mesiotelus tenuissimus (L. Koch, 1866)

Family **Lycosidae** Sundevall, 1833
Evippa praelongipes (O. Pickard-Cambridge, 1870)
Lycosa piochardi Simon, 1876

Family **Oecobiidae** Blackwall, 1862
Oecobius cellariorum (Dugès, 1836)
Oecobius putus O. Pickard-Cambridge, 1876
Uroctea hashemitorum Bosselaers, 1999

Family **Oxyopidae** Thorell, 1870
Oxyopes elifaz Levy, 2007

Family **Pholcidae** C.L. Koch, 1850
Artema nephilit Aharon, Huber & Gavish-Regev, 2017
Hoplopholcus cecconii Kulczyński, 1908

Family **Salticidae** Blackwall, 1841
Aelurillus gershomi Prószyński, 2000
Aelurillus nabataeus Prószyński, 2003
Cyrba algerina (Lucas, 1846)
Heliophanillus fulgens (O. Pickard-Cambridge, 1872)
Menemerus davidi Prószyński & Wesołowska, 1999
Mogrus logunovi Prószyński, 2000
Mogrus mirabilis Wesołowska & van Harten, 1994
Philaeus chrysops (Poda, 1761)
Synageles dalmaticus (Keyserling, 1863)

Family **Scytodidae** Blackwall, 1864
Scytodes kinzelbachi Wunderlich, 1995

Family **Sicariidae** Keyserling, 1880
Loxosceles rufescens (Dufour, 1820)

Family **Sparassidae** Bertkau, 1872
Cerbalus aravaensis Levy, 2007
Eusparassus walckenaeri (Audouin, 1825)
Micrommata formosa Pavesi, 1878

Family **Theraphosidae** Thorell, 1869
Chaetopelma olivaceum (C.L. Koch, 1841)

Family **Theridiidae** Sundevall, 1833
Latrodectus pallidus O. Pickard-Cambridge, 1872
Latrodectus tredecimguttatus (Rossi, 1790)
Steatoda paykulliana (Walckenaer, 1806)

Family **Thomisidae** Sundevall, 1833
Thomisus bidentatus Kulczyński, 1901 * (El-Hennawy, 2025: **New Record**)

Family **Zodariidae** Thorell, 1881
Pax meadei (O. Pickard-Cambridge, 1872)
Zodarion lutipes (O. Pickard-Cambridge, 1872)
Zodarion nitidum (Savigny, 1825)

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